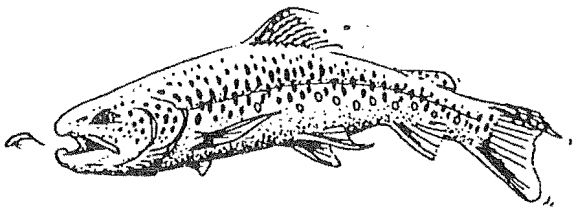

TROUT FISHING IN NELSON

MANAGEMENT OF A RECREATIONAL RESOURCE

A Thesis

submitted in fulfilment

of the requirements for the Degree

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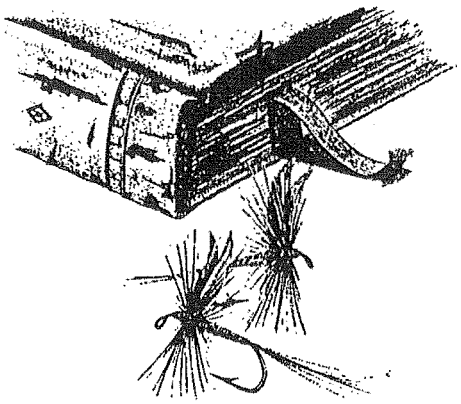
" In this new world of plastic, bionics, and science fiction come true, keeping our secret seems little price to pay.

Perhaps mine is the last retreat."

(Marsh, 1983:219)



ABSTRACT

This Study examines the recreation of Trout fishing on the rivers of Nelson, New Zealand.

It concentrates on two angling groups, namely adult whole season licence holders and professional fishing guides with their clients. Two questionnaires were the major source of data for the study.

Professional fishing guides as a group have never been studied or descibed in such a fashion, in any previous New Zealand study.

The study determines and explains features of freshwater trout angling as a recreational pursuit, by angler groups based within the study area. It was found that the two different groups, and sub - groups within, exihibit different behaviours, motivations, and success rates. The study also examines the patterns of angling activity within the study area and adjoining districts by the two study groups. It is shown that a relatively small number of rivers attract most angling activity. However the factors that attract anglers to each individual river are not necessarily the same.

Pressures placed upon the Nelson fishery, and their possible impacts, are assessed in a number of different ways. It is concluded on the basis of limited data that present angling activity is insufficient to be having a major influence on the fishery. However on the basis of angler comments, some anglers feel that changes are taking place.

A review of fisheries management practices in the study area shows that management objectives largely meet those of anglers. The final section identifies possible avenues management may wish to examine more closely

in the future. Factors such as angler education, ethics, and access being important.

This study has analysed the workings of one recreational fishery and has raised important issues for further consideration.

CHAPTER ONE: INTRODUCTION

1) General Introduction

New Zealand's trout fishing is acclaimed world-wide as providing one of the finest freshwater angling experiences available anywhere. The South Island of New Zealand in particular, is held in high regard for its scenery, solitude, friendly people, water clarity and large brown trout. The northern part of the South Island, which this study examines has trout angling of a high international, national and regional significance.

Concern over recent decades about a possible decline in the quality and quantity of some of these fisheries has been expressed by a number of individuals and organisations. Scientific studies have generally shown that most decreases in freshwater fishery values have been due to environmental and fish habitat considerations. Changes in land use patterns and catastrophic environmental events such as large floods are mostly responsible for short or long term changes.

Previous New Zealand studies have indicated that angling pressure has not been a significant influence on reducing fish stocks. These studies often only take one factor into account in assessing fishery values, that is fish numbers available to the angler. Quantity is relatively easily to assess by fish counts,drift dives and analyses of fish caught etc.However such analyes of quantity often ignore the quality of the angling experience available and the recreational "health" of an area. Quality of an angling experience depends upon the perception of each individual angler and is difficult to define precisely.For example fish numbers (quantity) may remain constant over time but the quality of the angling experience may diminish due to

overcrowding,with many anglers competing for the same resource as has happened in a number of overseas countries.Often, in such areas the "quantity" of fishing has been preserved or even enhanced through extensive regulation. However the need to implement and enforce regulations on fishing can often mean a significant loss in the quality of the angling experience.

North American researchers currently lead the world in studies assessing angling pressure as affecting the quantity and quality of particular fisheries. Comparable New Zealand studies are sparse. This study therefore attempts to examine both qualitative and quantitative factors, to explore the relationships between them, and to assess how they influence the behaviour of recreational anglers. The study examines the locational, spatial, and temporal behaviour of anglers, as well as reviewing some aspects of psychological and sociological behaviour. Finally the implications of these behavioural and locational patterns are discussed in relation to fisheries management.

Within New Zealand large changes have occurred in the patterns and intensity of angling usage over the past two decades.The popularity of troutfishing as a form of recreation continues to increase annually. New Zealand is also promoted overseas as an "anglers eldorado" (Grey,1926), by tourism interests,attracting an evergrowing number of international anglers each year. International experience has taught that all angling usage has some effect on fisheries values,with excessive angling pressure causing adverse effects on many previously important recreational fisheries. To what extent New Zealand fisheries,in particular Nelson,are subject to such pressures,is still largely unknown. However it is probable that such problems could develop at some stage in the future if the present (and future) usage of such fisheries remains unmonitored.

To the best of this writers knowlege, the cumulative impacts of two angler groups, namely local recreational anglers and professional fishing guides with

their accompanying overseas clients, have never been examined in one particular fishery within New Zealand. This study will examine the area administered by the Nelson/Marlborough Fish and Game Council, formerly the Nelson Acclimatisation Society. Boundaries of the former Nelson Acclimatisation Society District are used as this was the management organisation in place when research commenced. Halfway through the study, the management organisation changed in name and function, also expanding the previous management boundaries to incorporate the former Marlborough Acclimatisation Society. This change was a direct function of Government moves to restructure many "quango" bodies. Such changes also affected the naming of the study area. From this point on the study area is referred to as the Nelson angling District or simply the Nelson District.

2) Study Aims

The objectives of this study are to determine and explain some features of freshwater trout angling as a recreational pursuit by angler groups based within the Nelson angling District.

The study area encompasses the Nelson angling District but also discusses the adjoining Fish and Game Districts of the West Coast and Marlborough.Specifically the research focuses on seven major themes:-

1) To review the reputation, quality and features of the Nelson trout fishery.

The thesis will identify the characteristics of the fishery that are valued by local recreational anglers and other angling groups. It will also examine what other researchers have found and written with regard to the same study area.

2) To establish the characteristics of the user groups

The behavioural and personal characteristics that attend each angling group will be examined.

3) To establish the perceptions that anglers have of the study area.

This section of the thesis will discuss the opinions, ideas, and thoughts expressed about the Nelson angling District and show the extent to which they vary among anglers.

4) To determine the level of angling activity within the Nelson and adjoining angling districts by the above mentioned groups.

The objective is to provide an index of the angling intensity within the whole study area and on individual angling waters.

5) To establish the locational and spatial patterns of angling usage and investigate the factors underlying the distribution of such fishing activity within the study area.

This will show where anglers fish within, and beyond the District, and why they fish in such chosen locations.

6) To examine possible impacts or pressures upon the Nelson fishery by present angling activity.

This section will assess whether present levels of angling are affecting the fishery or anglers in any way. This assessment will take two forms. It will examine possible deleterious effects of angling on biological and environmental factors within the fishery. It will also assess the potential for the possible deleterious impacts of angling activity, on the recreational experience of anglers.

7) To review fisheries management practises within the Nelson angling District, with regard to study findings and if necessary suggest other possible options or refinements.

This section will discuss how well management objectives meet those of anglers and will also offer a number of suggestions that arise out of the study.

3) Chapter Format

This study consists of eight chapters. Chapter one has briefly outlined the research objectives directing the course of this study.

Chapter two explores the International and New Zealand literature in regard to recreational angling research. Angler behaviour, expectations, and satisfactions are examined, along with a number of important angler management concepts that have been developed by predominantly overseas researchers. Within this chapter New Zealand trout fishing is examined, illustrating the inherent differences between North and South Islands. Finally the Nelson regional study area and periphery are defined and explained. Important concepts such as fishing style, physical, social and biological attributes of the study area are also discussed.

Chapter three examines the New Zealand angling research literature relevant to the study. However the predominant role of this chapter is to describe the research methods used in this study, particularly the two major questionnaires concerning the collection of data on the characteristics and activities of local recreational anglers and professional fishing guides The specific mechanics of data collection are detailed along with an accompanying review of the strengths and weaknesses of the information collected.

Chapter four is concerned with the development of the guided trout fishing industry. This chapter traces the course of development up to 1990 and examines the attributes and professional operations of professional guides. The locational aspects, temporal patterns, and angling intensities of guided activities are discussed and accompanied with the characteristics of guided anglers described.

Chapter five examines the social and physical characteristics of local anglers based on a sample survey of adult, whole season licence holders resident in the Nelson area. This chapter also describes the general angling and behavioural aspects of such anglers and the factors underlying differences in their fishing participation and success.

Chapter six describes the locational and distributional aspects of patterns of angling activity by local anglers. This chapter also reviews the levels of angling intensities on angling waters, both within the Nelson District study area and beyond. The "most enjoyed" and "least enjoyed" catchments fished by angler respondents are examined along with the reasons for catchment popularity or unpopularity.

Chapter seven estimates total use of the Nelson fishery by all angler groups. Estimates of angling impact on the fishing resource are made with a number of different variables and the potential of anglers to adversely affect the fishery is examined. The chapter also explores angler perceptions of the degree of change within the Nelson fishery over time and the forms these perceived changes have assumed.

Chapter eight concludes the thesis and the reviews the implications of the study in regard to management issues within Nelson. Angler criticisms and management suggestions are discussed in regard to the study findings. In addition, a number of management suggestions are put foward by the writer.

CHAPTER TWO: CONCEPTUAL AND GEOGRAPHIC FRAMEWORK

1) General Recreational Concepts

Recreation is an important facet in the lives of millions of individuals around the globe. The Collins Dictionary (1981) defines recreation as any form of play, amusement or entertainment, that is used for refreshment of the body or mind. Taylor(1984) noted that recreation activities have one outstanding purpose in the lives of people. They contribute to their fulfilment as individuals and as effective functioning members of society. Bryan(1977) commented that researchers are pointing to evidence that individuals can center their lives around leisure activities as well as work. In addition, Roberts(1970) even stated that for many people leisure has now become such a central and dominant part of their lives that it is their behaviour and attitudes towards work that are determined by their leisure rather than the other way around.

Recreation as a human activity is growing rapidly both in importance and magnitude. Toynbee(1974) associated rises in recreation demand to increases in population, leisure time available, disposable income and the efficiency of transportation. McKelvey(1965) noted that participation in outdoor recreational pursuits in New Zealand has already been increasing much faster than the population. Trends of this nature, however, are more developed in other countries such as the United States or the United Kingdom.

2) Outdoor Recreation

Recreational activity can take many forms, however outdoor recreation has always been important as a form of recreational activity and participants can

be divided into possibly thousands of sub-groups, covering an almost infinite range of activities.

It is well documented that outdoor recreation is playing an increasing role in the relaxation of people (Clawson/Knetsch,1966, Darby,1967, Hughey,1982). Outdoor recreation needs certain resources to become attractive to individuals with recreational leisure time available. Possibly the major resource is water, for without water in a direct or indirect sense, there are few activities a recreationalist could pursue.

Water is an important recreational resource as well as being an essential and commercial commodity, freshwater being especially prized. Freshwater comprises only 3% of water on the globe, however apart from marine coastal areas, rivers and lakes are possibly more accessible to the recreational public through developments in roading and transportation. Taylor(1984) observed a natural facination for water which affects young and old and that draws people to an attractive river or lake. Taylor also states that with decreasing working hours and increasing prosperity, the demand for recreation on or near rivers,lakes and reservoirs will continue to grow. This demand for riverine resources can be compared to the work of O'Riordan(1967) who found that demand for outdoor recreation increases at a rate 40 times greater than the increase in population growth. If this is so, water resources will undoubtedly increase in recreational importance in New Zealand.

3) Recreational Freshwater Angling

One recreational activity directly requiring freshwater as a primary resource is trout fishing. Darby(1967) concluded that fishing has always occupied a special place amongst the recreational activities associated with river water, and that there is a trend towards increasing use. According to Allen(1957) the value of fishing as an outdoor recreation is derived from the satisfaction obtained by the participants. These satisfactions, in turn, stem from the

tangible rewards of the catch and from the less tangible, although equally real, pleasures provided by relaxation in pleasant surroundings.

Numerous studies have examined the importance of trout fishing in streams, rivers and lakes on an international and New Zealand basis and have examined various aspects of the troutfishing, from biological and physical aspects of fisheries themselves, to the sociological, physiological, geographical, and economic characteristics etc, of the anglers themselves.

4) Recreational Concepts of Direct Applicability to Angling

This section will examine and explain concepts relevant to the study and develop the conceptual framework to be used in later chapters when specific characteristics of recreational trout anglers are analysed.

Having now established that trout angling as a recreation is worthy of examination, the study will examine the precept that the perceptions and attitudes of trout anglers dictate their use, behaviour and appreciation or dissatisfaction with any fishery resource. Behavioural patterns can manifest themselves in the locational, spatial, and temporal distribution of angler activity, among other factors. From such behaviour, secondary angler motivations can be examined in more depth. Physical factors and biological considerations ultimately dictate the nature of any trout fishery, however in many cases these factors are stable and secondary considerations concerning the users of such a fishery assume more importance.

Brown(1968) examined angler participation, angler motivation, angler preferences and the determinants of these variables in the state of Michigan, USA. Brown detailed the motivational bases for participation in trout angling in relation to maximisation of angler satisfaction. He found that experiences other than catching fish are valued while fishing and that it is possible that an anglers attitude and the reputation of the area are more important than the fact of fishing opportunity or success. It was concluded that the better an

anglers catch, the more rewarding the experience was. Reid et al (1962) found that over 60% of angler dissatisfaction with fishing resulted from lack of fishing success.

Clawson(1965) stresses the importance of viewing fishing as primarily a recreation experience in which fish act as providers of food, trophies, challenge, excitement and status. Clawson(1959) had earlier made the distinction between the motivations of people fishing for recreation and for fun; the regenerative and theraputic effects of fishing on those who engage in it; and the negative aspect of fishing motivations which may be considered as an escape from other and less desirable activities or situations.

Reid, et al,(1962) measured user satisfaction, as an indication of recreational quality and concluded that user perceptions of area quality as expressed by their opinions and satisfactions were useful management tools when considered within the capacity of the recreational resource. Brown(1968) stated that the growing population of trout anglers embodies a great diversity of demand and that this diversity is the result of individuals desiring varied angling, and separate groups desiring special types of angling.

By understanding the motivations and expectations of anglers, specific angling statistics such as location and angling effort can be explained, as well as raising other questions or problems that may have been less visible at first. Adams(1979) states that circumventing the issue of tastes and preferences, generally leads to a situation in which various consumers' definitions of the relevant dimensions of their recreational experience are lumped together. Bryan(1977) suggested that a broad range of behaviours and orientations attend any recreation activity. Buchanan(1983) also concluded that satisfaction research must consider the possibility that within any activity, there may exist sub-groups of users who receive different satisfactions. In the case of this study it would be a serious oversimplification to view recreational angling as a homogenous activity. Therefore anglers should be classified into

different groups or segments based on the connection between the structure of their trip and the trip attributes which they value.

5) Qualitative and Quantitative Aspects of the Angling Experience

Although different anglers view different experiences in different or alternative ways, most anglers understand some concept of quality and quantity within angling.

Quantity in the form of fish stocks or rivers available to anglers is relatively easy to ascertain. While certainly important to anglers in regard to catch rates etc, it is possible that angling **quality** has the most important influence on anglers. The perception of quality may not be a concious decision on the behalf of the angler, but rather an underlying factor that partly determines angling activity and participation rates. Therefore by determining angling quality, the relative value of rivers to anglers can be identified. Concentration of fishing effort in certain locations is not the only way of assessing relative value. Factors important in determining angling quality to anglers include distance from home, ease of access, areas of fishable water, scenic beauty, peace and solitude, catch rate, and size of fish. Many of these factors, for example scenic beauty are passive but important components of a quality river fishing experience. Passive factors refer to elements of the angling experience that are not primary motivating forces but are nonetheless an important aspect of the final patterns of angling activity and behaviour.

Angler perception of angling quality was explored by Tierney, et al(1988), who found that highly valued rivers were not necessarily subjected to heavy angling pressure.Tierney et al also found that urban rivers were important primarily for their proximity and accessibility whilst remote rivers were valued for their scenic beauty and solitude. So while urban and remote rivers could both be considered quality fisheries, the reasons for their classification are likely to be different.

A Taranaki Catchment Commission(1980) Survey identified a number of parameters important in an individual angler's perception of general angling quality and quantity within Taranaki rivers. These factors were:

- quality and quantity of catch

- proximity/access to angling water

- river qualities and aesthetic factors

These factors can be sub-divided even further through the work of other researchers, such as Buchanan et al, (1981) who focused on the social group as a potentially important determinant of outdoor recreation activity. While this study does not examine angler social groups, the findings of Buchanan et al are relevant in that, it was found that different social groups engaging in the same activity often assign different meanings to that activity. Buchanan(1983) following up on his earlier work, studied 428 anglers who responded to twenty different recreation satisfaction scales and also reported secondary recreation activities in which they participated while fishing. Buchanan concluded that current research may be erroneous in attributing satisfaction scores to one main activity while failing to consider the influence of secondary activities.

While a number of factors might determine an anglers perception and behaviour patterns, the concept of recreational specialisation is still necessary in any conceptual framework of trout anglers. Bryan(1977), defined recreational specialisation as a continuum of behaviour from the general to the specialised. Bryan states that this is reflected by equipment, skills used, and preferences for specific recreation settings. Bryan studied 263 anglers from Wyoming, Montana and Idaho, USA. The anglers ranged from sportsmen with minimal interest and skill in the sport to those highly committed and specialised members of a leisure social world. In this case, leisure social world refers to the development of specialised communication channels by a recreationalist whereby the leisure social group becomes a

major or primary source of orientation and reward for members. Bryan concluded that:

- Anglers tend to become more specialised over time.

- The most specialised comprise a leisure sub-culture with unique minority recreationalist values.

- Increased specialisation implies a shift from fish consumption to preservation and emphasis on the activity's nature and setting.

- As specialisation increases, dependency on particular resource type increases.

Therefore understanding the diverse nature of the angling public is a major challenge facing recreational fisheries managers (Chipman et al,1988). Realistically, anglers should be considered a heterogeneous collection of sub-groups with differing objectives and expectations (McFadden,1969).

6) Recreation Opportunity Spectrum

Having established that anglers as a group are non-homogenous in their perceptions or behaviour, the concept of a **recreation opportunity spectrum** becomes important. Stankey(1974) states that the basic premise of the recreation spectrum concept is that a variety of environmental settings, "from the paved to the primeval", are needed to fulfill the many needs, motivations, and preferences that lead people to participate in outdoor recreation. Stankey elaborates on the recreation opportunity spectrum, dividing it into a number of catergories, the important ones relative to this study being:

6a) Receational preference

This concept concerns the demand or quantity of resource that is necessary for any given activity. However it must be bourne in mind that rates of

participation depend directly upon availability of such resources. Essential resources pertaining to angling are water, fish, and the environment.

6b) Substitutability

This refers to the extent to which recreation activities can be interchanged in terms of satisfying user's motives, wishes and desires.

Substitutability is concerned with psychological, sociological, and personality variables that lead to interchange among activities, rather than on the physical characteristics of the activity setting. For example angling in an urban, hydro canal for small rainbow trout would not necessarily represent an appropriate substitute for angling for large brown trout in a wilderness river just because both forms of angling occur in water. Very different motives and interests probably exist for these two activities. Recreational angling to a certain extent probably exibits little substitutability.

Angling is possibly contained within two "activity preference types" as defined by Hendee et al(1968) in Stankey(1974):

i) Appreciative-symbolic

The focus here is on appreciation of environmental qualities and preservation.

ii) Extractive-symbolic

This activity involves the extraction and appreciation of "trophies" from the environment. Hunting and fishing being major examples.

The combination of these two dimensions means little substitutability can occur due to the environment and the activity of angling being major components of the participants experience. This combination of factors leads on to:

6c) Dependent Satisfactions

This concept is related to substitutability in that recreational angling resources range from the readily available and common to the scarce and unique. Stankey(1974) recognised that certain satisfactions, such as challenge, solitude etc, are specifically linked to particular kinds of environments.These satisfactions are labelled "dependent". When the setting is lost, the capability to provide such satisfactions is similarly lost. Wilderness and white water rivers, for example, are settings that might produce such experiences for anglers.

6d) Externalities

The concept of externalities revolves around the costs and benefits associated with any fisheries management decision.Benefits that are not received or costs that are not bourne by the fisheries decision maker are called externalities (Stankey,1974).

Three types of emergent relationships exist. The first two: complementary and supplementary relationships can be grouped together, at least in relation to angling. These two relationships refer to the development of positive aspects whereby recreational users fully utilise a resource with no inter or intra-group conflict. The third relationship is a competitive relationship where changes in one opportunity cause negative aspects on another. The development of the professional fishing guiding industry in Nelson may be a possible example.

Stankey(1974) stated that functional planning (ie planning for one resource use at a time) probably tends to create competitive relationships and only occasionally leads to complementary or supplementary relationships. Thus, an integrated, multi-functional planning process is most often needed as planning programmes that provide a package of opportunities will generally encourage complementary and supplementary relationships.

6e) Carrying capacity

Carrying capacity refers to the capability of a recreational opportunity to produce a specified type or set of experiences (Stankey,1974). Recreational carrying capacity is not a simple, single, absolute value. Recreation managers are faced with complex sets of conditions, in addition they must cater for many different kinds of users: old, young, active, passive. They must provide opportunities for a wide range of values, many of which are incompatible. The principal goal of management then, is to maximise user satisfaction consistent with certain administrative, budgetary, and resource constraints. The recreational carrying capacity is the nature of use that can be supported over a specified time by an area developed at a certain level without causing excessive damage to either the physical environment or the experience for the visitor (Lime et al, 1974). Lime stresses three basic tenets of carrying capacity: a) management objectives, b) visitor attitudes, and c) recreational impact on physical resources, and also examines techniques for managing physical resources and visitors for carrying capacity. Options such as site management, regulating user behaviour and modifying user behaviour are also explored.

The components of carrying capacity and management techniques will be expounded and applied to trout angling in Nelson in Chapter eight.

7) The New Zealand Fishing Scene.

Trout angling in New Zealand has evolved around two major species, Brown trout (Salmo trutta) and Rainbow trout (Salmo gardineri), which comprise the primary basis of NZ recreational fisheries. These two species introduced in the latter half of last century have acclimatised spectacularly well, forming the basis of a national recreational fishery acclaimed worldwide.

Brown trout fisheries in New Zealand are primarily based in rivers while rainbow trout have dominated the lake fisheries, although this is not exclusively so.

Another broad generalisation is the importance of rainbow trout fishing in the North Island, the lakes of the central North Island being prime examples. Although the rainbow is distributed in the South Island, and in many river systems, its major importance as a recreational species is primarily in lakes. The brown trout, in contrast to the rainbow, is very widespread and occurs in most river systems from south of Auckland.

McDowell(1984) observes that the brown trout sustains most of the angling pressure in New Zealand and notes that without the brown trout there would be little fishing in many areas. Brown trout are considered a more cunning and wary fish than the rainbow which is more vulnerable to angling pressure. However the rainbow is often considered a superior eating and fighting fish than the brown, which is largely respected for the angling challenge it provides.

However suffice to say, the two species are important recreational species and are valued wherever they occur. Two other trout species have been introduced to New Zealand. These are the Brook char (Salvelinus fontinalis) and the Mackinaw (Salvelinus namaycush), however these species have extremely limited recreational potential due to their poor acclimatisation within New Zealand and localised distribution patterns.

Brown and rainbow trout often grew, to prodigious sizes when introduced into NZ, and continue to do so today. Zane Grey, an American angler, visited New Zealand in 1926 and experienced the trout fishing principally in the central North Island. His book "Tales of an Angler's Eldorado: New Zealand" focussed international attention on the trout fisheries of New Zealand for the first time on a large scale. Since that time literally hundreds of books, magazines, pamphlets, films and videos have featured New Zealand troutfishing.

The South Island, in many areas, has what are considered exceptional

recreational fisheries. These fisheries which are mainly based around brown trout, often of a large size, in clear water and in often spectacular surroundings are World renowned.

8) Classifications of Fishery Type

Jellyman(1982) describes three types of important river fisheries that important New Zealand angling rivers can be classified into:

i) Wilderness fisheries:

These rivers are characterised by remoteness from population centers, lack of road access, and unmodified catchments. These rivers rate extremely highly for the opportunity of fishing in peace and solitude, and scenic beauty.

ii) Scenic fisheries.

These are similar to wilderness fisheries in that they are generally remote from population centers and have high scenic beauty and solitude values. However they are usually accessible by road, more heavily fished and often exibit some catchment modification.

iii) Recreational fisheries

These are characterised above all by high angling use. Access to these rivers is good and they are often close to major population centers. Scenic beauty and solitude were less important than either wilderness or scenic fisheries.

These classifications were developed in order to identify rivers of National importance by Tierney et al (1988). However in this case they serve to illustrate the nature of many important South Island trout rivers and fisheries. Most Nelson District rivers can be classified into the above three catergories. The writer attempted to classify such waters using the information of Toynbee (1974) and personal experience, having fished extensively on all Nelson

waters included in this study. The following Table (2.1), gives some idea to the reader about the number of such types of fisheries within the study area. Many Nelson rivers however are not included within the table as it is felt that they possibly do not meet the above criteria.

Table 2.1: Possible Classifications of Important Nelson River Fisheries

Wilderness	Scenic	Recreational
Travers	Gowan	Buller
D'Urville	Maruia	Motueka
Sabine	Owen	Motupiko
	Mangles	Riwaka
	Matakitaki	Waimea
	Wangapeka	Maitai
	Baton	Wakapuaka

Rivers within the Nelson Region can be classified as clearwater, with a mixture of shingle, stone, or rock bottoms. They are clean and largely unpolluted. Access is readily available through extensive roading of catchments and the rivers contain good populations of self sustaining brown trout.

Entwistle(1989) discusses the Buller river catchment but his comments are generally applicable to the wider Nelson angling situation:

"One of the first things to impress an angler..... is the tremendous variety of different rivers in a relatively small area. Rivers range from bush clad streams within National Parks and Conservation areas, through to rivers and streams fringed with farmland. The water ranges from the wildest white water, to huge calm flat pools, from tiny intimate streams to large expansive rivers".

Entwistle(1989) also comments that fishing in clean and wild rivers for wild fish is the most prestigious and sought after experience in the trout fishing world. On a world wide scale it is becoming much less common to be able to fish in unobstructed, unpolluted, non-artificially stocked rivers. In many countries the few respectable fishing rivers left have become the reserve of the rich.

Entwistle defines five factors important in defining a world class fishery:

i) Variety of different waters

ii) Range of options under varying river and climatic conditions

iii) Access

iv) Fish numbers, fish size, fish fighting qualities, fish variety

v) Natural replacement of stocks

Entwistle concluded that the Buller trout fishery within the Nelson District contained all of these essential components often of outstanding quality. Possibly these characteristics are applicable to other rivers and catchments within the Nelson District.

It appears then that the Nelson angling distict has a large number of different opportunities available to anglers.

This large range of opportunities to some extent has shaped the management of the fishery and the behaviour of angler user groups.

9) Definition of the Study Area.

This study examines the area administered by the former Nelson Acclimatisation Society (fig. 2).

Richardson(1984) describes this area as covering an area of over 1 000 000 hectares in the north west of the South Island. The mountains of the main divide form the boundary between this district and its former easterly Marlborough neighbour.

The main divide separates the Nelson District from that of North Canterbury and to the west, the ranges which separate the Nelson and West Coast districts include the Victoria, Brunner, Lyell, Matiri, Arthur and Peel ranges.

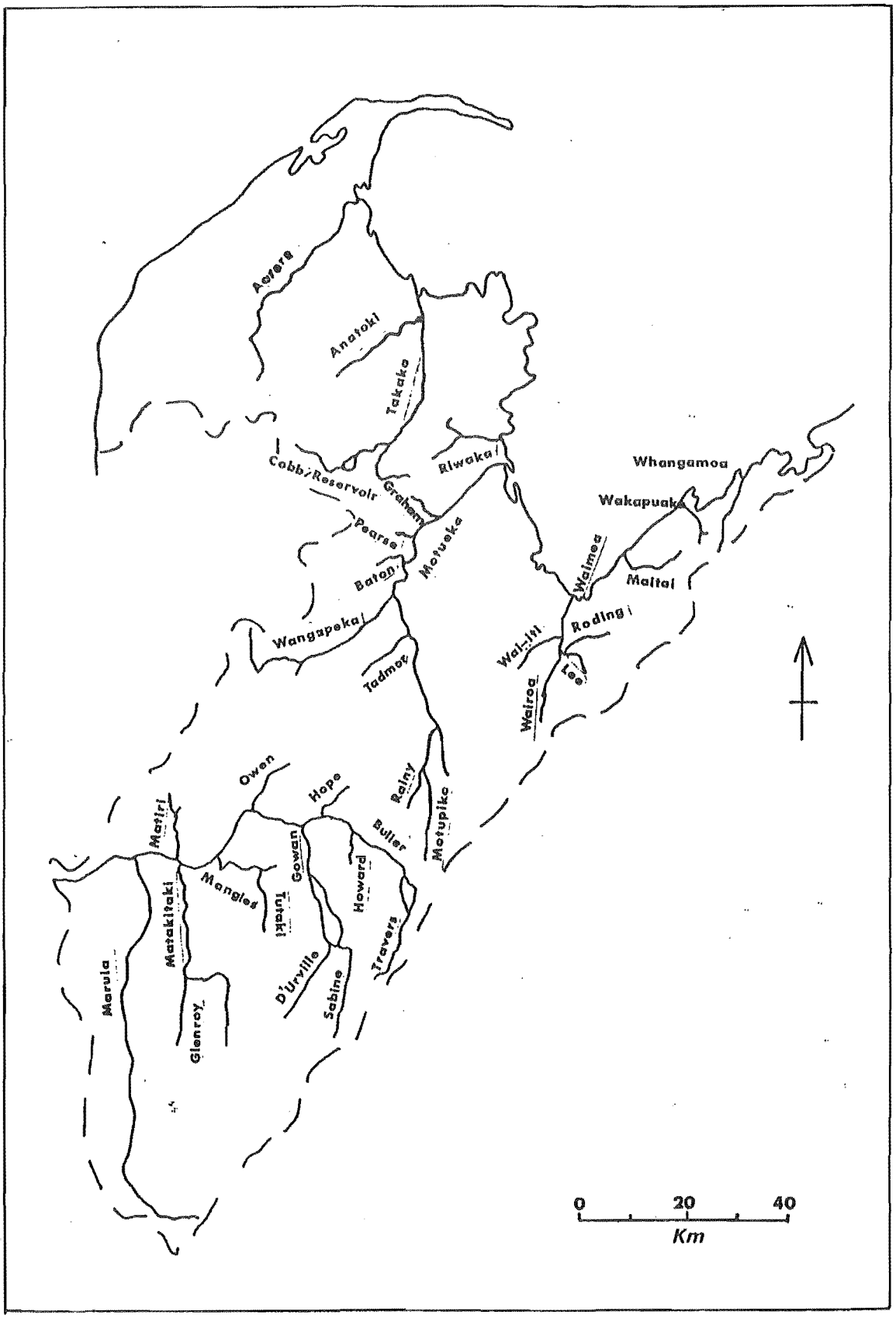
The Nelson trout fishery is based upon two major river systems within the district. These are the Motueka and Buller catchments. The Motueka catchment assumes a more or less central geographical position within the Nelson angling district whilst the Buller catchment occurs at the southern end of the fishery district. The lower portion of the Buller from the upper Buller gorge (below Murchison) is contained within the West Coast Fish and Game district.

Several other medium size catchments also exist within the study area, the rivers of Golden Bay occur in the north west corner of the district. The two major catchments here are the Takaka and Aorere. Also within the Nelson Angling District are a group of rivers classified as the Eastern rivers. The major catchment within this division is the Waimea, however three other small coastal stream fisheries exist. These are the Maitai, Wakapuaka and the Whangamoa.

The main population center in the district is Nelson City with its outlying suburbs such as Richmond, Brightwater and Wakefield. Much of the remaining population is rural and serviced by smaller townships such as

Figure 2.

The Study Area: Nelson, New Zealand



Motueka, Takaka and Murchison.

10) Management of the Fishery

The Nelson District under the jurisdiction of the Nelson/Marlborough Fish and Game Council, formerly the Nelson Acclimatisation Society , has a long history attached to the establishment and management of trout. Sowman(1981) details the establishment and functions of the Nelson Acclimatisation Society over the period 1863-1968, this gives a good insight into the earlier functionings of management in relation to the Nelson recreational fishery.

The new Fish and Game Council will continue, like the former Nelson Acclimatisation Society, to be governed by a council elected by a postal ballot of fishing and shooting licence holders. The council has one full time field officer based in Nelson who is engaged in both game and fisheries work.

This chapter has examined general recreation and angling research relevant to this study, as well as outlining the New Zealand and Nelson angling situations. The next chapter will examine more specific angling literature in regard to this study and describe the research methodology of the study.

CHAPTER THREE:

ANGLING STUDIES AND RESEARCH METHODS

Related research and research methodology are important aspects of any study. As a result this chapter will examine the specific New Zealand angling research relevant to this study. However the major thrust of this chapter is to outline and describe the research methods used in this study and to review the success of such methods.

1) Related New Zealand Studies

There have been a number of studies examining trout angling in New Zealand, the majority being scientific reports concerning biological aspects of trout, largely ignoring the human/social aspects of freshwater angling. However some research has focused upon the activity patterns of trout fishermen. These studies, based primarily on fishing diary schemes organised by government departments, have been described by Allen and Cunningham(1957) and Graynoth(1973).

Allen and Cunningham(1957) summarise the results of six seasons of angling statistics collected from 16 out of the 26 Acclimatisation Societies in New Zealand between the 1946/47 and 1951/52 seasons. Their research aimed to obtain information on the :

- state of fish stocks.

- size and nature of fishing effort.

- size and local distribution of the angling catch.

- effect of regulations either proposed or in force.

The study by Graynoth(1973) was based on data collected from the 1946/47 to 1951/52 national diary scheme plus similar diary schemes conducted in the 1957/58, 1962/63, 1967/68 seasons, in addition to postal questionaires in 1958 and 1963. Graynoth attempted to monitor changes in the state of fish stocks, the size and nature of the fishing effort, the size and distribution of the angling catch, as well as collect data on the characteristics of fishermen.

The former Nelson Acclimatisation District was included in all nine seasons that data was collected by the national diary schemes. In addition some of the fishermen of the district were included in the two questionaire schemes. Using the above data a separate report was written on the Nelson Acclimatisation District by Graynoth and Skrzynski(1974).This report discusses the characteristics of Nelson fishermen,fish stocks and the individual waters of the Nelson District. Data was also collected over three fishing seasons, 1969-1972 by the Nelson Acclimatisation Society through an identical diary scheme.The state of fish stocks, the size and nature of the fishing effort and the size and distribution of the angling catch were again the major elements of investigation. The results of these three diary schemes organised by the Nelson Acclimatisation Society appear in its 1973 annual report.

Toynbee(1974) investigated the activity patterns of Nelson anglers, however the methods and emphasis of this particular study varied from previous works. Toynbee incorporated new material concerning the group nature of fishing activity which had not been collected in previous studies. In addition Toynbee examined more thoroughly the women and junior whole season anglers and part season anglers. Toynbee investigated factors underlying the distribution of fishing activity, as well as the differences in the amount of fishing and the success of individual anglers. These aspects were not dealt with in much detail in previous studies.

Richardson, et al,(1984) produced a valuable study examining the relative value of Nelson rivers to New Zealand anglers, which placed the Nelson trout

fishery in a National context.

More recently the Nelson/Marlborough Fish and Game Council has completed a survey of angling and general public use of the Motueka river catchment during 1989/90. The study results, however were unavailable to this writer, as the final report had not been completed. In many ways this was unfortunate, as the Fish and Game report could have provided valuable information for comparison and contrast with the present study, both studies being on the same time frame. The Motueka study examines a local angling resource whilst this study provides a regional overview of fishing activity within the Nelson region.

Robertson(1986) investigated the recreational use of Marlborough rivers, however angling use was a minor component as other water based recreationalists were also surveyed. However this study put angling in context with other user groups and therefore is relevant to the issue of management.

Perhaps the study most similar to the present one is Smith(1989). This study investigated Wellington Acclimatisation District anglers (now the Wellington Fish and Game District) and was a survey of angling use and opinion. Smith provides valuable comparative material often directly applicable to the Nelson District.

The intention of this present study was to collect similar data to many previous studies albeit updated, however it also explores a number of factors previously ignored in New Zealand fisheries research. The investigation of professional fishing guides and some of their overseas clients covers new ground. This is significant as the advent of overseas anglers and paid professional guides is a relatively new phenomenon within New Zealand angling circles. Overseas anglers have been coming to fish in New Zealand since the turn of the century, but it is only in the last decade or so that this industry has really begun to develop. This is especially true of the Nelson

region. The characteristics and behaviour of guides and their clients has never been examined formally before in New Zealand. However the major departure this study makes from previous studies is to analyse and assess patterns of angling activity by two user groups, namely Adult whole season licence holders and professional fishing guides and their clients within the study area. This present study evaluates the impacts and possible pressure angling groups may be exerting upon the Nelson fishing resource on both a qualitative and quantitative level. Significant recreational aspects such as the angling opportunities available and angling carrying capacities are incorporated within this examination of impact. The study also goes one step further to briefly assess fisheries management within the Nelson angling District. Implications of the study are examined in management terms and where appropriate possible alternative options are suggested.Future trends within the Nelson fishery are extrapolated to provide an index of probable future angling usage and behaviour.

2) Research Methods

The former Nelson Acclimatisation District and adjoining regions were chosen as the focus of the study as the author has an intimate knowlege of these areas. It was necessary to concentrate on a specific geographic region because angler user groups could be more easily identified and contacted. The data for the study was obtained from two main user groups, namely local recreational anglers and professional fishing guides with their clients.

3) Local Recreational Anglers

3a) Characteristics of Licence Holders.

The area encompassed by the study area also conforms to the area described as the Nelson Bays Local Government Region by the 1986 NZ census reports (Series B, report 16, 1986), which had a total population of 68,409. This population can be further subdivided into local Government

regions:

Table 3.1: Population by Local Authorities

Local Government Region.	Total Population.
Golden Bay County	4,593
Waimea County	18,015
Nelson City	33,684
Richmond Borough	7,152
Motueka Borough	4,965
Total Nelson Bays Region	68,409

During the 1989/90 angling season the former Nelson Acclimatisation Society issued a total of 3095 fishing licences to fish for acclimatised fish within its jurisdiction. A number of different catergories and associated charges occur within these total licence sales. For example junior anglers pay much less than adult anglers, and daily or weekly licences cost less than whole season licences. These catergories were combined with population statistics to indicate the popularity of freshwater angling within the Nelson District (Table 3.2).

It appears that freshwater angling is a relatively popular recreation with 4.25% of the total population holding a trout angling licence.

Adult licence holders have higher rates of participation as a percentage of the population group than do juniors. This may be because many people begin trout angling later in life. These percentages would be even more significant if the female population was removed from consideration. Male anglers comprised 96.18% of the 1989/90 anglers surveyed, so therefore female

anglers are relatively insignificant as a proportion of total population. This means that possibly as much as 8% of the male population was involved in angling for trout during the 1989/90. This estimate is probably liberal considering that an unknown number of anglers, living outside the District, may have purchased a Nelson licence. However such purchasers are possibly holiday makers in the district, and thus only acquire a short term licence. Anglers living outside the Nelson District can use licences purchased in other districts to fish within Nelson so most outside anglers fishing in the District would not need to purchase a licence. Tourist and guided anglers may need to purchase an angling licence to fish, but many such anglers travelling the length of the Country, purchase tourist licences in the North Island to cover their fishing in New Zealand and consequently do not need to buy a Nelson licence.

Table 3.2: Numbers and Types of Angling Licence Sold

Licences	Proportion of Population(%)			
Type	Number sold	Adult Pop.	Junior Pop.	TotalPop.
Adult Whole Season	1738	3.56	-	2.54
Adult Week/Daily	720	1.47	-	1.05
Adult All Classes	2458	5.03	-	3.59
Junior (12-16yrs)	296	-	1.50	0.04
Junior (under 12)	341	-	1.73	0.05
Junior All Classes	637	-	3.25	0.09
All Licence Classes	3095	-	-	4.25

Graynoth (1974) observed that in 1951, 2.3% of men over 18, held a full season Nelson licence and that in 1974, with the inclusion of short term

licence holders, possibly 7% of the adult men were freshwater anglers. It appears that the strong growth between 1951 and 1974 has not continued, but that there has been some increase in the popularity of angling.

3b) Nelson Regional Angler Questionnaire

A questionnaire was the major method of data collection.This was sent out after the 1989/90 fishing season ceased at the end of April 1990.

The purpose of getting individual anglers to complete the questionnaire was to obtain detailed information about their fishing activity during the 1989/90 season and also to assess characteristics and perceptions of the fishermen themselves. Information was collected on a range of components.These variables were:

-age

-sex

-residence

-experience

-skill level

-mobility

-angling methods

-form and timing of outings

-travel

-locational aspects

-angler variables

-number/species of trout caught

-% killed, % catch and release

-angler perceptions-various etc.

The research conducted in this study concentrated on adult whole season licence holders of which there were 1738. A random sample of the 1988/89 adult whole season licence holders was undertaken and 400 licence holders selected to be sent questionnaires. It was assumed that part season licence holders were less keen, less skilful, participated in trout fishing less and consequently had less importance in a study primarily assessing angler use and impact upon a fishery. The study of Toynbee(1974) provides some evidence for this in terms of participation rates during the angling season. Toynbee identified that adult whole season licnce holders comprised 69% of licence sales and were responsible for 86% of angling activity within the district. Junior licence holders were also omitted from this study as it was assumed that under 16 year olds lacked the mobility and knowlege of most adult anglers. Most juniors would lack motorised transport due to their age and would concentrate the majority of their fishing activity on water bodies that were readily accessible from their place of residence. For this reason, although they would have a significant impact on local rivers, next to major angler generating areas, they would be less significant on a regional basis. The other major reason for omitting junior anglers was that it was felt they would be less capable of completing the local angler questionaire. If junior anglers were to be questioned another less extensive questionaire would need to be designed and distributed. This was considered to be a minor priority compared to the rest of the study and possibly a waste of resources considering the time and financial restrictions on the study. Toynbee(1974),perhaps examined junior anglers adequately within the Nelson district.

Recreational anglers from other angling Districts who fished within the Nelson angling District, were omitted from this postal survey for reasons of time and difficulty in identifying such anglers.

As the former Nelson Acclimatisation Society was undergoing a period of change through its transition into the Nelson/Marlborough Fish and Game Council, 1989/90 licence holder addresses were uncollated and therefore unavailable to this researcher. Licence holders who were sent the questionnaire were selected randomly,being selected as one in every four names from a catalogue of 1988/89 licence holders. The questionnaires were sent out in early June 1990, with a covering letter explaining what the purpose of the questionnaire was, what was required of the individual angler, and generally attempting to gain the confidence of the selected respondent (see appendix). Respondents were asked to complete the questionnaire as soon as possible. Non-respondents were sent reminder notices by mail in an attempt to obtain a high response rate. Later on secondary notices were sent to those who still had not responded. Using the names and addresses of the previous seasons licence holders undoubtedly resulted in the loss of some responses, but was less than expected, as most adult whole season licence holders appear to be regular purchasers of such licences and live in established residences. As a result most people that the questionnaire attempted to contact received their questionnaires. Of the 400 anglers contacted, 288 returned questionnaires that were of value, providing the data requested of them (table 3.3).

A number of questionnaires never reached potential respondents due to changed or wrong address, this proportion was relatively minor at 5.25%, these questionnaires were returned by the postal service. Non-respondents who received questionnaires but never replied numbered 75 or 18.75% of the total randomly selected group of 400. This response rate was good compared to other angling surveys concerning angling in Nelson e.g. Toynbee(1974)

88.0% and 79.5%, Richardson(1984) 37.4%. Such surveys all had varying research methods so response rates can not be directly compared between surveys. The survey of Smith (1989), who surveyed Wellington anglers for a response rate of 33%, closely approximated the methodology of the present research.

Table 3.3: Local angler Questionnaire Response Rates.

Category	Number	% Total
Returned useable questionnaires	288	72.00
Returned non-useable/Deceased	20	0.50
Returned non-useable/No Licence	4	1.00
Returned non-useable/Declined to help	7	1.75
Returned Non-opened/wrong address	21	5.25
TOTAL	325	81.25
Non-Returned questionnaires	71	18.75
GRAND TOTAL	400	100.00

4) Professional Fishing Guiding

A second user group of the Nelson Angling District that this study examines are the professional fishing guides and the travelling international anglers they guide. This association of users was further subdivided so that the professional guides and the guided anglers were examined separately.

4a) Professional Fishing Guides

The fishing guides are a group of fishery users which has developed within the Nelson District within the last decade or so, with no full-time professional guides prior to 1980. In 1990 this total had reached six, with at least as many part-time guides operating within the District. Within this time the guides have

become a significant user group of the Nelson trout-fishing resource, and as such warrant examination. As no previous studies within New Zealand have attempted analysis of fishing guide behaviour and locational aspects of their commercial activities, this study covers new ground. Consultation with a number of Nelson full-time guides helped develop a conceptual framework, around which a questionnaire was designed. Fishing guides within the Nelson District who undertook a significant number of guiding days were selected by talking to guides within the industry. These people of whom there were 12 were sent guide questionnaires. Only 4 were members of the New Zealand Professional Fishing Guides Association(NZPFGA). The covering letter for the fishing guide questionnaire gave certain assurances in order to protect the commercial interests of the guides being questioned. Guides were assured that all data collected would be analysed collectively to prevent dissemination of information on individual guide activity patterns. Guides were also coded to maintain anonymity. Only the author knew which guides corresponded to each code. Locational aspects of the questionnaire were sensitively designed in an attempt to ensure a representative response rate without jeopardising guide participation through asking unnessarily complicated and commercially sensitive questions. Guide questionnaires were designed as a monthly examination of activity patterns. Guides were requested to complete a new questionnaire for each month in which they did some guiding. All guides were sent seven questionnaires for the seven month fishing season. However not all guides operated on every month of the season. Information from the guide questionaire collected 13 components of the month's guiding activity.These items were:

i) Guided Angler Statistics:-

-country of angler origin

-number anglers guided per day

-skill level

-client mobility

-sex

-angling method

ii) Trout Statistics For Month:-

-number/species trout landed

-number trout released

-number trophy fish

iii) Guiding Statistics For Month:-

-number days guided

-number helicopter trips

-number car/boat trips

iv) Guiding Location Components For Month:-

-fishing days per river location

-code numbers for rivers, with accompanying river code sheet to assess locational and spatial aspects.

The guides were contacted by telephone to check their progress toward the end of the fishing season. The overall response rate for the questionnaire scheme was good with 58 % of guides contacted contributing data to the study.

4b) Guided Overseas Anglers

Guided overseas anglers were also examined through a smaller scale questionnaire. One hundred of these questionnaires were printed and were posted to fishing guides at the same time as the fishing guide questionnaires. Different numbers of guided angler questionnaires were sent to each guide. The numbers sent were dependent on the status, experience and amount of guiding work as established by the author. The major fishing lodge in the Nelson District was also approached and agreed to canvas overseas anglers through the questionnaire format. Information collected about guided overseas anglers attempted to establish characteristics about their fishing behaviour in New Zealand. Only guided overseas anglers were questioned as unguided international anglers were considered difficult to contact, and guided New Zealand anglers were thought to be relatively rare. Therefore it is uncertain what proportion of angling effort is expended by visiting unguided overseas anglers on Nelson rivers, however it is likely to be a small proportion of total angling effort. The components examined in the guided overseas angler questionnaire then, were:

-origin

-sex

-age

-length of visit

-number of days fished

-approximate costs

-reasons for fishing in Nelson

-angling methods

-other New Zealand areas fished

-likes/dislikes in Nelson.

Only 11% of questionnaires were returned completed, which illustrates that relying on others to collect information for a study of this nature is not a viable option. Although the data collected from overseas anglers was biased in that it only examined guided anglers,it does provide limited information on a user group of the Nelson fishery.

5) Other Data Sources

Other data sources examined include record cards of the major fishing lodge and some other guides. These cards show locational and other significant aspects of guided fishing in Nelson. These cards are expected to be completed by guides after every day's fishing to provide a record of that day's fishing for the sake of general interest to other guides and clients. This card collection is not totally complete as some are only half completed and many days guiding are unrecorded as some guides were more methodical than others in completing the cards. However the days guided that are recorded provide a historical record for the 1987/88,1988/89,1989/90 seasons and allow comparisons to be made. Some guides have warned that some data recorded is of dubious accuracy, especially the river location, which may just specify the general catchment in which the day's angling occurred.

This chapter has described the specifics of data collection within this study. The following chapter will now detail the findings of research on professional fishing guides and their activities within the Nelson study area.

CHAPTER FOUR: PROFESSIONALLY GUIDED TROUT FISHING

1) Conceptual Discussion

Traditionally angling for trout in New Zealand has been a recreation practised by local anglers. However with world wide improvements in air travel, increasing leisure time and prosperity, and the decline in the quality of many overseas fisheries, an ever increasing number of overseas anglers are seeking an alternative experience. To many such anglers, the ultimate angling experience is an overseas fishing trip. The global demand for such experiences has increased markedly over the last two decades as an international sport fishing market has developed around such tourist anglers, and has marketed itself accordingly. New Zealand is part of this development process, and has developed services for international anglers in response to this demand. The development of fishing guides, working on a professional basis, to assist visiting anglers has occurred, and this has fuelled overseas angler demand through increased promotion and marketing.

Professional fishing guides differ from local recreational anglers, in that they are paid by their clients, for their services in relation to fishing. Guides also differ from their recreational counterparts in that they do not generally fish themselves while being paid by a client. Their role is to maximise client angling satisfaction and ensure the client has the best opportunities for success under the prevailing circumstances. Local recreational anglers, on the other hand, are angling for their own satisfaction and recreation, and do so without any paid assistance

Trout fishing guiding within the Nelson District is a relatively new phenomenon, first developing a decade ago as a result of international

demand and the early marketing endeavours of a handful of enterprising individuals. Early success of such ventures led to an expansion of the guiding industry within the Nelson District, with the provision of additional services as the industry became more structured. Provision of accomodation and highly skilled guides being important considerations in this regard.

Being primarily centered on the natural resource base of Nelson rivers, the guiding scene is a delicately balanced, fledgling industry. The developing and ongoing progress of the industry relies heavily upon the environmental and biological "health" of the Nelson rivers. Entwistle(1989) acknowleges two factors in the development of the Nelson fishing guiding industry:

i) the integrity and professional expertise of the guide.

ii) the quality of the fishery.

He states that in the longterm "the integrity and professional expertise" of the guide assumes the greatest importance, but "the quality of the fishery", more significantly assisted the establishment of the early businesses. This writer feels however that the quality of the fishery is the most important facet affecting guided trout angling in Nelson , even though the integrity and professional expertise of the guide is undoubtedly important. A "healthy" fishery will support a number of professional and recreational user groups , largely avoid conflict among users, and provide satisfaction to most users.

A fishery under change, however, or one that provides different patterns of angling, environmental, or biological aspects will produce conflict among users and decreasing levels of satisfaction for many individuals. The levels at which these thresh-holds are reached will vary with individual anglers, however less skilled anglers would be the first group expected to be affected. The demarcation between skilled and unskilled anglers is arbitary, but local recreational anglers often fishing few days per season would be likely to be less skilful than professional fishing guides who view angling as their

occupation, spend numerous days on streamside and have an intimate knowlege of the waters on which they guide. The skill and knowlege of professional fishing guides could compensate for a decrease in the number of trout available to anglers, as the involved guides become more proficient in their understanding of the fishery on which they guide and also the capabilities of the anglers they guide.

Few local anglers will develop the skill, knowlege and recreational specialisation that professional guides have about trout angling. Some local anglers will exceed fishing guides in angling skill levels, however these anglers are comparitively few in number. The knowlege and experience that fishing guides develop through their occupation becomes a key factor which tends to ensure success for guided clients , even though the client's actual angling skills may be far less than the average local angler who meets with limited success. The skill of most fishing guides then, means that they are still able to locate good numbers of trout even though the overall availibility of fish may have decreased, changed their location, or become more inaccessible to anglers through changing behavioural patterns induced by angling pressure.

However guiding activity is still influenced by angling quality. If the quality of the fishery reached an undefined lower threshhold then fishing guides would undoubtedly be affected, despite their skill level. For any decline in angling quality it is assumed through the process of recreational specialisation that the recreational anglers would be affected first followed by commercial interests which are highly specialised and able to ignore minor fluctuations in angling quality through generally higher angling skill levels.

Possibly fishing guides through their inherent angling characteristics have the ability to put more pressure on the angling resource, especially if it was undergoing a period of change or decline. It is the contention of this researcher that the Nelson trout fishery is presently undergoing a period of change. This period is not necessarily one of decline but of a change from the

previous status quo, where the fishing patterns of local anglers were rarely interrupted. It is during such periods that angling carrying capacity becomes important. The problem may not be so much biological and environmental, rather, it may be of a sociological nature where rather than complementary and supplementary relationships existing between groups, conflict emerges manifesting itself in inter and intra-group conflict. For example the presence of professional fishing guides may have no impact on the fishery. However if low numbers of trout are present during a particular season when there are increased numbers of recreational anglers having decreased levels of angling success, then guides may be blamed for the recreational anglers' lack of success. Another example may be specialised local anglers who practice catch and release trout fishing, blaming other anglers who do not release their catch, for the decrease in their levels of angling success. It is probably inevitable that any change in angling opportunity, whether real or perceived, will be accompanied by conflict of some kind between angler groups concerned to protect their own interests. Whether professional fishing guides are having any impact on the Nelson fishery is uncertain, however this general theme will be explored within this study. Later chapters will discuss the possible scenarios that guided angling may be having on the Nelson trout fishery, while this chapter will describe specific guiding activity during the 1989/90 angling season.

2) The History and Development of Professionally Guided Trout Fishing in Nelson:

Prior to 1980 there were no fishing guides available on a professional basis, in the Nelson District. Before this time visits from overseas anglers did take place, but were not common, and those anglers wanting help sought the advice of local anglers (Entwistle,1989).

Three individuals established guiding businesses in the Nelson District in 1980. One of these guides began at St.Arnaud, in the upper Buller area, and

the other two in Nelson City. For the St.Arnaud guide the Buller system was the major guiding location whilst the two Nelson based guides placed a greater reliance on the Motueka system and the rivers of North West Nelson. The guiding industry in the Nelson District has developed from these modest beginnings and ten years on is much more structured and mature in its outlook.

The most dramatic development of the trout fishing guiding industry in Nelson has occurred in the Buller catchment, this area also has the most data available on guided fishing.

The first major obstacle to encouraging increased numbers of overseas anglers was the problem of accomodation which suited the needs of a predominantly North American client base. Anglers from the United States form the majority of travelling international anglers possibly because they have greater disposable incomes, are more prepared to travel abroad and are keener anglers than anglers from other countries. However the major attractions of New Zealand to American anglers may be the large average size of trout, coupled with the similarity of cultures between countries, more specifically that the language spoken is the same. Marketing considerations are also important as the American market is heavily targeted by New Zealand tourist promoters, often for the above reasons.

The guided fishing scene has grown with the increase in Worldwide interest inthe area,to the extent that within the Buller catchment in 1990, there are:

- Three lodges providing top accomodation for visiting anglers (Lake Rotoroa Lodge,Alpine Lodge,Moonlight Lodge).

- Many motels and hotels featuring guided fishing amongst services available for guests (in Westport,Reefton, Murchison,Owen River).

- Four registered members of the New Zealand Professional Fishing Guides

Association, resident within the catchment area,providing full-time service. The Guides association was established to maintain and enhance the quality of guides on a national basis. The association was established by guides and membership is voluntary, however members must meet certain criteria based mainly on work experience.

- Seven registered professional guides resident outside the catchment area,offering services that include fishing in the area on a regular basis.

- At least four other unregistered guides offering guided fishing trips independently and/or in conjunction with registered professionals.

- Plus part-time guides assisting with guiding shortages during the peak season at lodges,or casual work from motels and hotels.

Outside the Buller catchment development of the guiding industry has not been so dramatic, nonetheless it has been significant. Until recently no specialist fishing accomodation had been constructed solely for this purpose.This has changed with the construction of a fishing lodge in the lower Motueka catchment expected to be operational for the 1990/91 season.This lodge will use the Motueka and tributaries as well as the rivers of North West Nelson on a fly-in basis.

Two full time registered guides already operate principally within the Motueka catchment. In addition some other part-time guides operate,though the number of days guided are often minimal. This writer can account for at least 20 such days since talking to two such individuals and the final total is likely to be more than this.

Expansion of the guiding industry from Nelson City outwards will possibly occur within the next few years. Further expansion of the guiding industry within the upper Buller catchment is difficult to predict, however, the availability of work limits the numbers of full time guides operating. At present

it appears that the number of guides operating in the upper Buller catchment has stabilised, with no change in numbers for several years. Guided fishing is still expanding in areas of the Buller catchment outside the present study area. The latest development being the construction of the Rough River Lodge, within the Grey river catchment, however almost certainly,a major proportion of guided fishing from this lodge will occur on lower Buller tributaries and quite possibly encroach into the Nelson/Marlborough Fish and Game District e.g. Maruia, Deepdale,Matakitaki rivers.

3) Characteristics and Professional Behaviour of Fishing Guides.

The services offered by fishing guides differ markedly, with different levels of expertise, professionalism and charge-out rate.

Different guides appear to favour different waters with distance from place of residence probably being a major determinant of angling location.

This study can probably only comment on what occurs within the Buller catchment as the writer has experience within the guiding industry in this area and most importantly all guiding data collected in the 1989/90 Trout Fishing Guide Questionnaire, comes from the Buller catchment.

Costs to the guided angler per day of fishing vary widely with the upper limit for a top professional being around $500 and the lower limit for a casual guide minimal, perhaps $50. The most common daily rate would be around $400-$450.

Guides provide the vehicle, often a 4WD, to reach the fishing location and lunches, although these are often prepared by a lodge. Travel time to fishing destination may take as long as two hours, although it is generally less than this. The guide often provides fishing tackle for poorly equipped anglers. Local fly patterns are provided as part of the service.

The most important function of a guide apart from his attributes as a

professional paid companion, is his ability to locate feeding trout. In most cases this means the guide's ability to "spot" trout, that is locate trout by eyesight. Complementing this skill is the guide's knowlege of locations and ability to anticipate circumstances such as weather, angling pressure etc, in order to give the paying angler, whatever his/her angling abilities, the best possible chance to gain maximum satisfaction from the days angling.

A guide must have an ability to relate to clients', a thorough knowlege of the regions angling waters, be an experienced and expert angler and have the ability to pass on his knowlege to the client. A well rounded guide with the above characteristics is probably paid on a comparative scale to his overseas counterparts.

The typical day begins at 8.30am, departing for the fishing location and returning at about 6pm. Spotting conditions are best in the morning and early afternoon, hence the daily routine. The Motueka river system however, has some spectacular evening rises and the new lodge there will undoubtedly include this in their daily angling schedule, weather and environmental conditions permitting. Different guides will use the time within the day differently as it relates to their particular guiding style.

A guide's work is seasonal, the availability of clients highly variable, and the guide's associated costs high. Most guides view their occupation as a lifestyle, rather than as a well paid job.

Many guides operate on a day to day basis, however most professionals have their services booked in advance, the established professionals often building up a client base of return customers. Attracting clients to the Nelson area is often done on an individual basis by guides. The recommendation of a particular guide by past clients is fairly important here. The major fishing lodge in Nelson has a yearly brochure etc sent Worldwide as well as annual promotional trips to the United States and the United Kingdom etc by the

owner. A major international fishing promotion company known as Frontiers International, also promotes New Zealand and Nelson. This company offers a booking service, based on strict standards imposed upon lodges and guides.

4) Recent Guiding Activity

The trout guiding industry in Nelson has grown from its humble beginnings in the early 1980's. This is possibly due to the promotion of NZ and Nelson as an angling location, but also due to a number of professional guides establishing international reputations and having been resident in the area for a number of years. This professionalism, coupled with client satisfaction and a growing number of overseas anglers prepared to travel to exotic locations has led to a growth in the Nelson fishing guiding industry. Unfortunately statistics and records on early guiding were rarely kept. However as the industry has developed and become more organised many guides began to keep records. This included the major fishing lodge, which asked contract guides to complete record cards at the end of each days angling. It is from some of these cards, and information from other guides that historical data in guiding activity patterns was gathered. Prior to 1987 limited data exists. Some information was offered by one guide in particular, however, this material was isolated from any other useable information.

The time period covering the past three successive fishing seasons,1987/88, 1988/89, 1989/90, can be accounted for in terms of accurate guiding records. However these records are likely to be an underestimate of guiding activity during these seasons due to factors explained later in this chapter. The records will be discussed as is, however, and an estimate of overall activity will be made in chapter seven. The 1987/88 and 1988/89 seasons will be discussed first, followed by the results of the 1989/90 trout fishing guide questionnaire.

4a) Fishing Guide Activity During the 1987/88 and 1988/89 Seasons.

During the 1987/88 season, a total of 274 days guiding for 1146 trout landed can be accounted for, whilst the 1988/89 season consisted of similar figures, 275 days guided for 1077 trout landed (table 4.1 and 4.2).

Table 4.1: Guiding Statistics For The 1987/88 Angling Season.

Month: October	Local Rivers	Helicopter Rivers	Total
Days Guided	42	-	42
Fish Landed	173	-	173
Fish Killed	19	-	19
Month: November			
Days Guided	20	2	22
Fish Landed	65	32	97
Fish Killed	4	0	4
Month: December			
Days Guided	31	2	33
Fish landed	116	7	123
Fish Killed	4	0	4
Month: January			
Days Guided	40	9	49
Fish Landed	146	83	229
Fish Killed	3	0	3
Month: February			
Days Guided	50	6	56
Fish Landed	159	50	209
Fish Killed	7	0	7
Month: March			
Days Guided	58	4	62
Fish Landed	218	72	290
Fish Killed	6	2	8
Month: April			
Days Guided	8	1	9
Fish Landed	12	13	25
Fish Killed	0	0	0

Table 4.2: Guiding Statistics For the 1988/89 Angling Season.

Month: October	Local Rivers	Helicopter Rivers	Total
Days Guided	16	3	19
Fish landed	48	25	73
Fish Killed	5	5	10
Month: November			
Days Guided	41	3	44
Fish Landed	133	51	184
Fish Killed	6	0	6
Month: December			
Days guided	22	3	25
Fish Landed	73	26	99
Fish Killed	1	0	1
Month: January			
Days Guided	42	4	46
Fish Landed	154	19	173
Fish Killed	3	0	3
Month: February			
Days Guided	53	19	72
Fish Landed	148	185	333
Fish Killed	12	0	12
Month: March			
Days Guided	54	3	57
Fish Landed	139	23	162
Fish Killed	1	0	1
Month: April			
Days Guided	11	1	12
Fish Landed	37	16	53
Fish Killed	2	0	2

The average number of trout caught per day during 1987/88 and 1988/89 , based on monthly totals remained consistent for angling occurring on the

local rivers. The highest monthly average being 4.2 trout landed per days guided fishing, while the lowest was 1.5 trout per day. All months, except three, exceeded 3 trout landed per guided angling day.

In contrast to this the helicopter guided days averaged much higher daily catch rates. All 14 months exceeded 3.5 fish per guided day, and six exceeded 10 fish per day. The number of guiding days which used helicopter transport were 24 days for the 1987/88 season and 36 in 1988/89. The maximum total for any one month was 19 days flown in February 1989, while the lowest monthly usage was in October 1987 when no helicopters were used.

Fish numbers killed were very low, with October of both fishing seasons being the major month in which fish were killed. Typically the monthly kill rate was 2-3% of total landed catch.

Guiding activity varied over both seasons, in terms of the distribution of days guided. There was however a trend toward increased guiding activity in February and March of both seasons. April was the least fished month during both seasons.

These statistics come from fishing lodge records and do not take account of independant guiding work, which to some guides is the most significant proportion of their seasonal workload. The information collected does not necessarily record every day guided from lodges as guides have informed this writer that they often forget to complete the cards or deliberately refrain from completing such cards, especially when no trout were landed for such a days angling. Therefore these guiding statistics are an underestimate of guiding activity within Nelson, because they only include figures from guides based in the Buller Catchment and do not include professional Nelson City based guides and casual part-time guides outside of the Buller system.

From this writers knowlege and opinion it is felt that if the 1987/88 and 1988/

89 records were doubled it would more accurately reflect the level of guiding activity within the Nelson district. That would take the seasonal totals of days guiding to 548 days in 1987/88 and 530 in 1988/89. Even so, these figures may be conservative. However the statistics analysed earlier are likely to be indicative of the general nature of guiding activity within Nelson.

5) Guiding Statistics and Locations for the 1989/90 Angling Season.

This writer, in an attempt to solve some of these problems in regard to the availability of information, sent all professional and semi-professional guides within the Nelson District, questionnaires to capture data on the 1989/90 season. Guides to be sent questionnaires were determined from a list of members of the New Zealand Professional Fishing Guides Association, other guides who were not members were identified through talking to people involved in the industry. The questionnaire required participants to fill out one form for each month on which they guided. This survey had a relatively high response rate at 54%, but once again information was only forthcoming from the Buller guides. The Nelson City based guides provided no written information, but the Buller guide information provides a good base on which to predict total guiding use on Nelson rivers. It is the writers opinion, based on inside knowlege of the Nelson Guiding industry, that the questionnaire respondents undertook the majority of guided days within the Nelson District during the 1989/90 angling season.

It is also the writers opinion that the guiding information supplied is factually accurate. Being involved within the guiding industry allowed access to information that otherwise would have been unavailable to other researchers, this was possibly because guides were more prepared to divulge information to someone who was already involved in the industry and also because they felt they had nothing to conceal from a person who already knew their guiding waters and behaviour well. Involvement within the industry may have discouraged the Nelson City based guides as the writer has had less contact

with such individuals, however in discussion with several guides who failed to complete questionnaires it is felt that most non-response was due to apathy. It is also the belief of the writer, that the small number of days often guided by such individuals was an embarrassment to them, as it is prestigious in guiding circles to have plenty of work throughout the season.

The Fishing guide questionnaire contained four sections. These focussed on i) client anglers; ii) trout caught; iii) guiding activities; iv) locations fished. Each section will be discussed in turn.

5a) Guided Angling Statistics

5b) Guide Characteristics

During the 1989/90 angling season, 612 days guided angling were undertaken by seven respondents. Of the guides responding, five were fulltime professionals who earn the majority of their yearly income through fishing, the other two individuals were part-time guides who worked through the peak guiding season but had other occupations during the off season.

5c) Guided Angler Origin

Anglers using guides came from a wide range of countries (table 4.3).

Anglers from the United States were the most common clients of fishing guides, followed by anglers from Australia, New Zealand, and the United Kingdom. Interestingly, New Zealand anglers comprised 10.6% of guided anglers. This was suprising in view of the "D.I.Y" nature of NZ anglers, and the often perceived high expense of hiring a guide by many recreational anglers. It is not known where in New Zealand such guided anglers came from, however they would almost certainly be from outside the Nelson District and most probably from the North Island.

Table 4.3: Country of origin For Guided Anglers During the 1989/90 Angling Season

Country of Origin	Number of anglers	%
United States	204	61.6
Australia	38	11.5
New Zealand	35	10.6
United Kingdom	32	9.7
Canada	5	1.5
Colombia	5	1.5
Switzerland	3	0.9
Singapore	2	0.6
Japanese	2	0.6
Austria	2	0.6
France	1	0.3
Germany	1	0.3
Holland	1	0.3
Total	331	100.0

The number of Japanese anglers consisted of two individuals only. This is of interest because New Zealand in recent years has expanded its tourist market to take account of the large numbers of Japanese tourists presently visiting NZ annually. Such changes to general New Zealand tourism do not appear to have affected theNelson guiding industry. Possibly this is due to Nelson not being a major tourist destination, rather, being a specialised location for tourists who have come to participate in a specialist activity - Trout fishing. Also it may be due to marketing considerations on the behalf of the trout fishing . The Japanese fishing market has not been marketed extensively, due to language barriers etc, and the most likely probability is that the more lucrative United States, United Kingdom and Australian markets

have not yet been fully exploited.

It may be that different guides have differing client bases, however the client base of Entwistle (1989) suggests that there have been no major changes in the origin of guided anglers since the development of the guiding industry in the Nelson District. However the anglers that come to fish in any one year, from any one origin point, may be affected by factors such as the economy, other opportunities, or marketing factors in the country of origin. At the time of writing, the guiding industry is worried about the present conflict in the Middle East, concerning the invasion of Kuwait by Iraq, and the possible impact of this on energy costs and subsequent tourist travel behaviour.

5d) Ratio of Guided Anglers Per Fishing Guide

Of the 331 guided anglers recorded as having fished with Nelson guides, most fished individually, or with one other person apart from the guide (Table 4.4).

The high guide/angler ratio is perhaps, a reflection on the individual nature of trout angling, and possibly reflects a guide reluctance to service large parties of anglers, due to problems of transport,instruction etc.

Table 4.4: Numbers of Clients Accompanied Per Individual Guide, 1989/90.

Number of Anglers Per Guide	Number of Days	(%)
One	286.5	47.3
Two	294.5	48.6
Three	18.0	2.9
Four	7.0	1.2
Total	606.0	100.0

5e) Skill Level of Guided Anglers

Fishing guide respondents were also requested to assess the skill level of the guided anglers(Table 4.5).

Table 4.5: Skill Level of Guided Anglers.

Skill level	Number of Anglers	(%)
Excellent	33	9.6
Good	110	31.9
Fair	88	25.5
Poor	114	33.0
Total	345	100.0

These figures suggest that the average guided angler is a fair to poor angler as rated by the guide respondents. This may explain why such anglers hired a guide, but most probably explains the difficulties experienced by visiting anglers in adapting to Nelson angling conditions. However, it seems certain that most guided anglers, whatever their skill level, hire a guide in an attempt to maximise the benefits of a short stay in a strange environment.

New Zealand brown trout though, are renowned internationally as providing challenging angling. Bill Hoyt, an angler from the United States who visited New Zealand in 1990, is quoted as saying, when discussing New Zealand trout fishing,"this is definitely a doctorates lesson in fly fishing"(Los Angeles Times, 16/7/90, page C12). This comment illustrates the fishing skill level often required to be consistently successful on Nelson trout streams. By contrast American and British fishing is often accepted as providing, in general, easier angling opportunities due to lower water clarity, smaller non-wild trout stocks etc, making trout easier to catch. However this is a major generalisation. Many intensely fished areas within both regions are renowned for the challenging angling available. For example, Henry's Fork - Montana, Beaverkill - New York, Letort Spring Run - Pennsylvania, Silver Creek - Idaho or the Test river in Southern England are regarded as such areas by international standards.

5f) Guided Angler Physical Mobility

In addition to angling skill level, guides were also asked to rate their clients' physical mobility levels (Table 4.6).

Mobility is important in many rivers within the study area because of the need to often walk relatively long distances to locate individual trout. A highly skilled client with high levels of physical mobility would be expected to consistently obtain the best results from a guiding viewpoint.

Table 4.6: Guided Angler Physical Mobility

Mobility level	No. of Anglers	(%)
Excellent	137	40.2
Good	101	29.6
Fair	60	17.6
Poor	43	12.6
Total	341	100.0

It would seem therefore that most guided anglers could be classed as having good physical mobility in regard to moving about on streamside, but it is also apparent that significant numbers of predominantly elderly guided anglers have difficulty moving about. This may have some influence on the locations such individuals are taken to fish by guides.

5g) Gender of Guided Anglers

The gender of guided anglers was also collected. Males comprised 78.2% (n=276) of guided anglers, while females made up a suprising 21.8% (n=77). The number of female anglers was suprising as female anglers have traditionally accounted for low levels of angling participation in past New Zealand angling surveys, commonly 5% or less (Toynbee,1974, Smith,1989) etc. However different cultures may have different rates of gender participation. It is this writers opinion after talking to the fishing guides involved in the survey, that many of these women were accompanying husbands or male friends. Such women often did less fishing than their male counterparts, due to lower levels of angling expertise. There were, however,

some very accomplished female anglers included in the 1989/90 guiding questionnaire replies.

5h) Angling Methods of Guided Anglers

Angling methods used by visiting anglers were very specialised. Upstream fly fishing comprised 99.2% (n=598) of guided days fished in Nelson, whilst the only other method used was spinning which accounted for 0.8% (n=5) of guided activity. The dominance of the upstream method of fly fishing is significant in that it represents the highest degree of specialisation within the sport of trout angling. Most guided anglers come to New Zealand to fly fish and the upstream method of nymph or dry fly fishing is reinforced by the fishing preferences of the guide, and the often tough fishing situations brought about by clear water and wary trout. In Nelson upstream angling is most successful because of high water clarity and an upstream approach by an angler is less likely to be detected by super-sensitive trout. The 5 days guided spin fishing possibly refer to guides introducing a newcomer to angling with the newcomer not having the skill or inclination, or the guide not having the time or patience, to develop fly fishing skills.

6) Trout Catch Statistics During 1989/90.

For the 1989/90 season , 7 fishing guides accounted for exactly 1800 trout landed by clients. Of these 1795 were brown trout (99.7% of the total catch), with rainbow trout only contributing 0.3% (n=5).

6a) Catch and Release

Of the 1800 trout landed 1760 were released alive. This level of catch and release (97.8%) illustrates the dedication of guides and visiting anglers to conservation and the maintainence of adequate fish stocks. In the majority of cases, it is the guided angler who decides to release the fish landed, but sometimes guides must persuade clients to refrain from killing a particular

fish.

6b) Trophy Trout Landed

Trophy trout are a major reason for overseas anglers to visit New Zealand. The definition of a trophy is dependent on the eye of the beholder, the size and nature of the stream, the species of trout and the angling method used. Ron Mackay, a Buller trout guide, defines a trophy trout as a fish being 6lb or over (2.7Kg+). It is this definition which was used when asking respondents how many trophy trout they had witnessed their clients landing during the 1989/90 season.

Guides assisted their clients in landing 223 brown trout 6lb or over(table 4.7). These fish accounted for 12.4% of all fish landed for the season. Riverine trout of this size and number are rare on an international basis.

Table 4.7: Trophy Trout Landed By Guided Anglers.

Location	Number of Trophy Fish Landed (2.7Kg+)	
	Local/Vehicle Access	Helicopter Access
Nelson	69	5
Marlborough	12	-
West Coast/NW Nelson	39	98

The rivers fished on helicopter trips accounted for the majority of trophy trout landed, with West Coast and North West Nelson destinations (both within the West Coast Fish and Game District), providing the most trophy fish per unit of guiding intensity as compared to the local rivers which had lower ratios of

trophy fish to relatively greater guiding effort. However the local, vehicle access rivers, of particularly Nelson and the West Coast provided good numbers of large trout, illustrating the quality of such readily accessible fisheries.

7) Guiding Activity 1989/90 Season

According to the fishing guide respondents, 612 guiding days occurred during the 1989/90 angling season. As indicated earlier in this chapter, this is without doubt an underestimate of total guiding activity within the Nelson and outlying districts. These statistics do however, give a good insight into the state and nature of guiding activity within such a region.

Of the 612 days guided by respondents, 89.3% (n=546) involved car or boat transport. Less than 20 days used boat transport on Lakes Rotoiti and Rotoroa to gain access to the Travers, Sabine and D'Urville rivers, therefore vehicular transport was undoubtedly the major mode of transport to angling areas. Helicopter transport was used on 10.7% of guided days (n=66), to gain access to remote wilderness rivers inaccessible by road.

8) Locational Components of Guiding

The final section of the questionnaire asked guides where they had fished with clients during the 1989/90 season. It was expected that this question would be a contentious issue among guides, and response rates were expected to be lower than other sections of the questionnaire because it was felt that some guides would object to naming the areas in which they guided for commercial reasons. The fishing guides co-operated well after assurances of confidentiality and anonymity, most guides, however, were not too concerned about naming general angling locations to the river scale.

9) Specific Guiding Waters and Activity Patterns.

Rivers close to the area of client accomodation, as expected, had higher

levels of usage, however guides were obviously willing, or found it necessary, to travel relatively large distances to fish such areas as the West Coast. Through personal communications with the respondents, it was generally conceded that the past season had been a difficult one, with low water flows, scary, and decreased fish stocks. This may be partially responsible for the pattern of long travel distances to fish when other closer locations are available, however other factors such as client demand for a "remote" experience may also be important in this regard.

The major catchment fished by guides was as expected the Buller catchment, at 67.2% of total guided effort (table 4.8).

Table 4.8: Guiding Activities By Catchment or Region.

Catchment/Region	Days Guided	(%)
Buller Catchment	411.0	67.2
West Coast Region	84.5	13.9
Marlborough Region	40.5	6.7
North West Nelson	38.0	6.1
Motueka Catchment	38.0	6.1
Total	612.0	100.0

Clearly the Upper Buller catchment sustained the most guiding activity within the Nelson region, whilst the Motueka catchment was relatively seldom used. The importance of the West Coast, Marlborough, and North West Nelson fisheries, outside of the former Nelson Acclimatisation District, are significant, accounting for over a quarter of the guiding activity of Nelson District based guides. This also means however, that about three-quarters of guided activity is undertaken within the Nelson District, most significantly within the Buller Catchment.

Total guiding use of the Motueka catchment is uncertain as the Nelson city based guides were unwilling to co-operate with the survey, it is without doubt much higher than this writers data suggests. Guiding by Nelson based guides also directs an unknown amount of activity into the helicopter rivers of North West Nelson, as well as minor amounts of activity into the local Eastern river systems. One Nelson city based guide, unwilling to complete questionnaires, stated to this writer, that he made moderate use of the Eastern river systems. Estimates of such unrecorded usage will be made in chapter seven by this writer, in an attempt to give some indication of total guiding use of the Nelson fishery.

Other areas likely to have relatively high levels of guiding use by Nelson City based guides are the Rai/Pelorus areas. Such areas were within the former Marlborough Acclimatisation District and are now incorporated within the new Nelson/Marlborough Fish and Game District. The Pelorus, and its major tributary the Rai, possibly sustain high levels of angling use from both Nelson and Marlborough recreational anglers.

Statistics from the survey show that guiding effort is spread over a large geographic area and a large number of rivers. Respondents of the survey, did not however guide on any of the Eastern or Golden Bay rivers. This was possibly because of travel distance factors, however the perception of these areas as having generally poor fishing compared to other Nelson locations, is probably the most significant factor in their reported non-use.

Rivers with low to nil usage were possibly under-utilised generally because of low fish numbers, with the probability of low guiding success. Excessive travel distance was probably the other major consideration of under utilised rivers. However many rivers received moderate guiding usage despite their travel distance or accessibility. Fish stocks and the possibility of good fishing success often appeared to over-ride travel and time considerations, where angling use of such rivers was concerned.

The rivers that had the most intense guiding activity during the 1989/90 angling season all occured within the Buller catchment (appendix vi, tables 9-13). These were the Mangles river at 14.2% of total guided use in 1989/90, the Buller (above Kawatiri) (11.3), Buller (below Kawatiri) (11%), Owen (8.8%), Maruia (6.3%), and Tutaki (6.2%). The Mangles river and its major tributary, the Tutaki, absorbed 20.4% of total guiding effort which is approximately one in every five guiding days.

Following these "high" use guiding rivers, another group of "moderate" use rivers can be identified. These rivers range in usage from 3.3 - 5.3% total guiding use. They are tributaries of the Inangahua, most notably Larry's Creek (5.3), Grey river tributaries, especially the Rough river (4%), Upper Wairau (3.8), with the Matakitaki, Motupiko and Inangahua rivers all equal at 3.3%(see appendix vi: Tables 9-13). Only two of these rivers, the Matakitaki and the Motupiko are within the Nelson Fish and Game district, being situated in the Buller and Motueka catchments respectively. The Upper Wairau (above Wash Bridge), is situated in Marlborough, whilst the Inangahua and tributaries, as well as the Grey river tributaries are located within the West Coast fish and Game District.

"Low" guiding intensity rivers included the Lower Wairau (2.2%), Mokihinui (above forks) (2.1%), all other tributaries of the Upper Buller (2.0%), Upper Karamea tributaries (2.0%), Gowan (1.9%), Travers (1.8%), Wangapeka (1.6%), all other tributaries of the Motueka (1.5%), Karamea (above bend) (1.3%), and other rivers within the West Coast (1.0%) (see appendix vi: Tables 9-13). It is notable that the majority of these low guiding use rivers could be classified as Wilderness rivers: the lower Wairau, other Buller tributaries, other Motueka tributaries, and the Gowan being the only exceptions in this case. The Mokihinui, Upper Karamea and tributaries, as well as other West Coast rivers, are all within the West Coast Fish and Game District, with the Wairau in Marlborough.

For most of these "high to low" guided rivers, the number of days guided on them is probably minor compared to the number of days fished on them each season by local recreational anglers.

There is a strong seasonal patterning of guided activity with the months of January, February and March providing the most guiding work for fishing guides. October, November, and the first half of December provide moderate levels of work, while the month of April has minor usage by guides. These seasonal patterns of guiding activity are similar to those established in the 1987/88 and 1988/89 guiding seasons.

This chapter has examined the development, character and activity patterns of the professional fishing guiding industry within the Nelson study area. From here the characteristics of local recreation anglers during the 1989/90 will be outlined and discussed.

CHAPTER FIVE:
CHARACTERISTICS OF LOCAL ANGLERS

Local recreational anglers are the major angler user group within the Nelson trout fishery. Of these anglers, adult whole season licence holders are probably the most significant sub-group, undertaking most of the fishing activity within the District. Such anglers comprised 56% of total licence sales within the study area during the 1989/90 fishing season.

This chapter examines the characteristics of such anglers, their general angling behaviour and their fishing success in terms of trout landed. It is necessary to understand such angler preferences and behaviour in order to estimate the levels and type of angling use that the Nelson fishery sustains. Without information on such an important segment of the angling population this study would be of limited value in assessing angling usage of the Nelson trout fishery.

1) The Social and Physical Characteristics of Nelson Anglers

1a) Place of Residence

The majority of anglers within the Nelson angling District are urban based. Most anglers live within the urban area of Nelson City and its surrounding satellite areas. The town of Motueka is also significant, however other smaller rural towns such as Murchison and Takaka appear to be under represented despite Toynbee's(1974) conclusion that such areas have greater than normal angler representation within the population.

Respondents were categorised into the catchment regions within they lived. Four regions were used, the same as those identified within the local angler regional questionnaire. These were:

- Buller

- Motueka

- Eastern

- Golden Bay

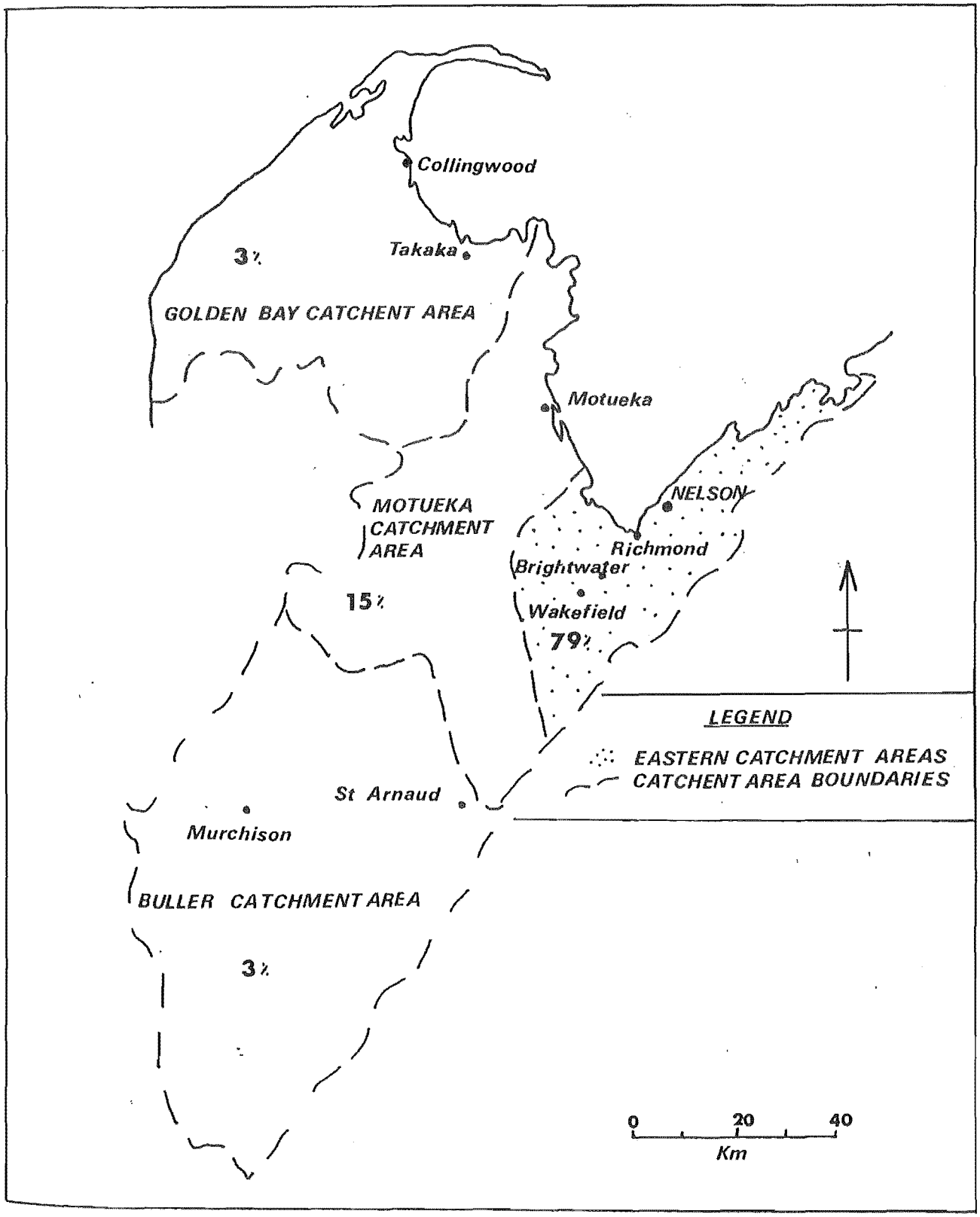
These catchment areas are unequal in size (fig.4) but were considered useful in mapping respondents residences. Previous studies such as Toynbee(1974) analysed angler residence place by grouping respondents into urban areas or towns. This writer, however, wished to attempt a different approach, avoiding a multitude of angler residence locations, to make analysis more efficient. Therefore angler residence was mapped via the four catchment areas identified within the Nelson Regional Angler Survey.

From the map it can be seen that the Eastern River catchment, including Nelson City, provides the major share of whole season respondents. This is not unexpected as this is the major population base within the Nelson angling district. The Buller and Golden Bay areas have relatively few anglers. This is due to small rural based populations rather than lack of angling opportunities. The Motueka catchment area generates almost 1/6 of the district's anglers, whilst there is no record of residence place for 35 respondents. For every angler originating from the Buller and Golden Bay combined, two originate from the Motueka and five from the Eastern catchments (1:2:5). It appears from comparison with population statistics (chapter 3), that angling participation by anglers living in any one catchment area, is a function of population.

1b) Age

Questionnaire respondents were asked to nominate their age within a number of pre-arranged age groups. A high response rate was gained, with only 2 respondents not indicating their age.

Figure 4: Catchment Regions Within the Study Area and Residence Locations of Questionnaire Respondents (%)



The graph (fig.5) shows that a wide range of age groups are attracted to trout angling with the smallest group being in the 16-25 year bracket, with the largest group being in the 36-45 year age group. Many anglers also fish into old age. Angling appears uncharacteristic compared to many other sports in that higher numbers of participants in the lower age brackets would possibly be expected. This may be due to many participants being attracted later in life, younger members of society perhaps having other interests or committments before their mid-thirties. These people may be attracted back to angling in later years when they become established in careers and relationships.

Smith (1989),in a survey of Wellington anglers, found that the proportion of respondents in each of his defined age catergories was relatively consistent, with a peak in the 31-40 year age group catergory. These findings were consistent with this study, when the differences in age group classifications between studies were taken into account. This would suggest that Nelson anglers show similar age characteristics to their angling counterparts in other New Zealand angling districts.

1c) Gender

Freshwater angling in Nelson is obviously a male dominated sport. Out of the 287 respondents, only 10 were female (fig.6).

Women have traditionally had low rates of participation in angling, however these participation rates have always been higher than many other outdoor sports such as hunting.

Recruitment within the sport possibly excludes females, due to cultural aspects and the the often held perception that angling is a male sport. Although changing gender roles will undoubtedly lead to more female anglers

Figures 5 and 6:

Figure 5: Age of Local Angler Respondents, 1989/90

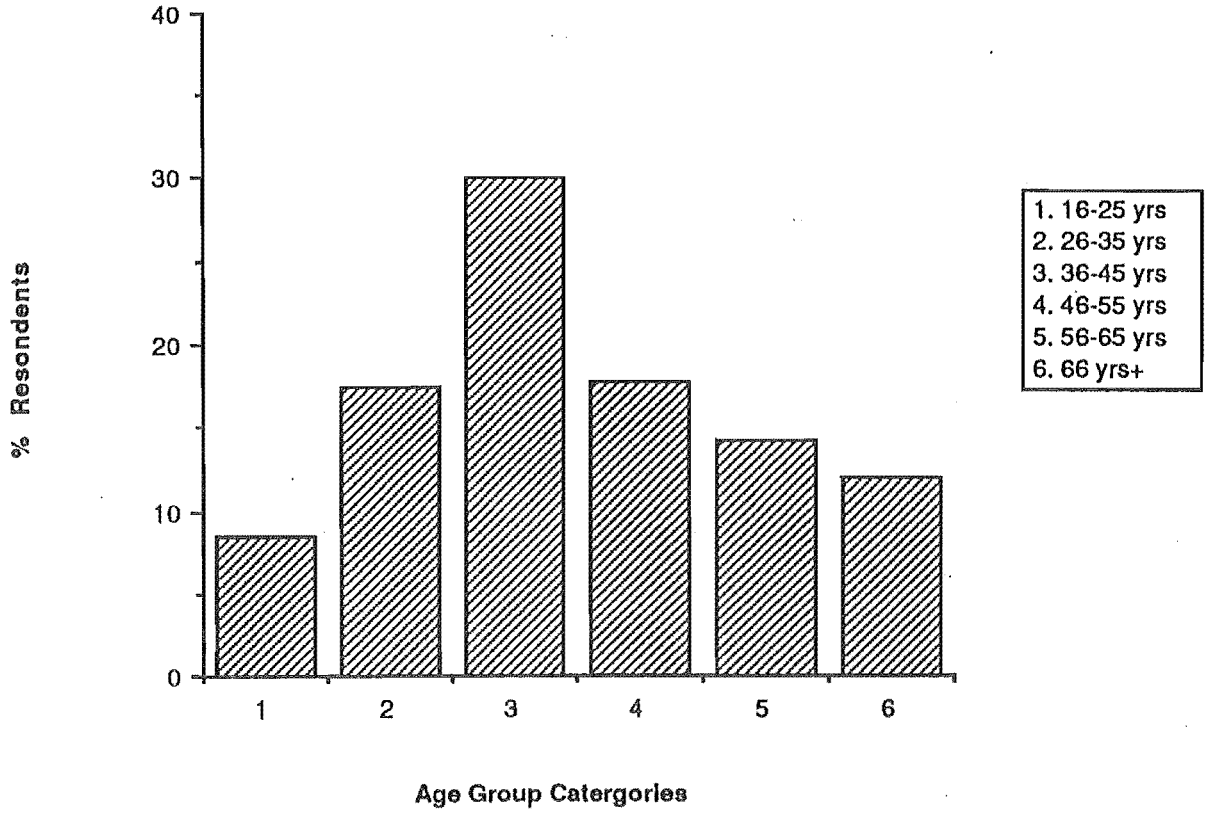
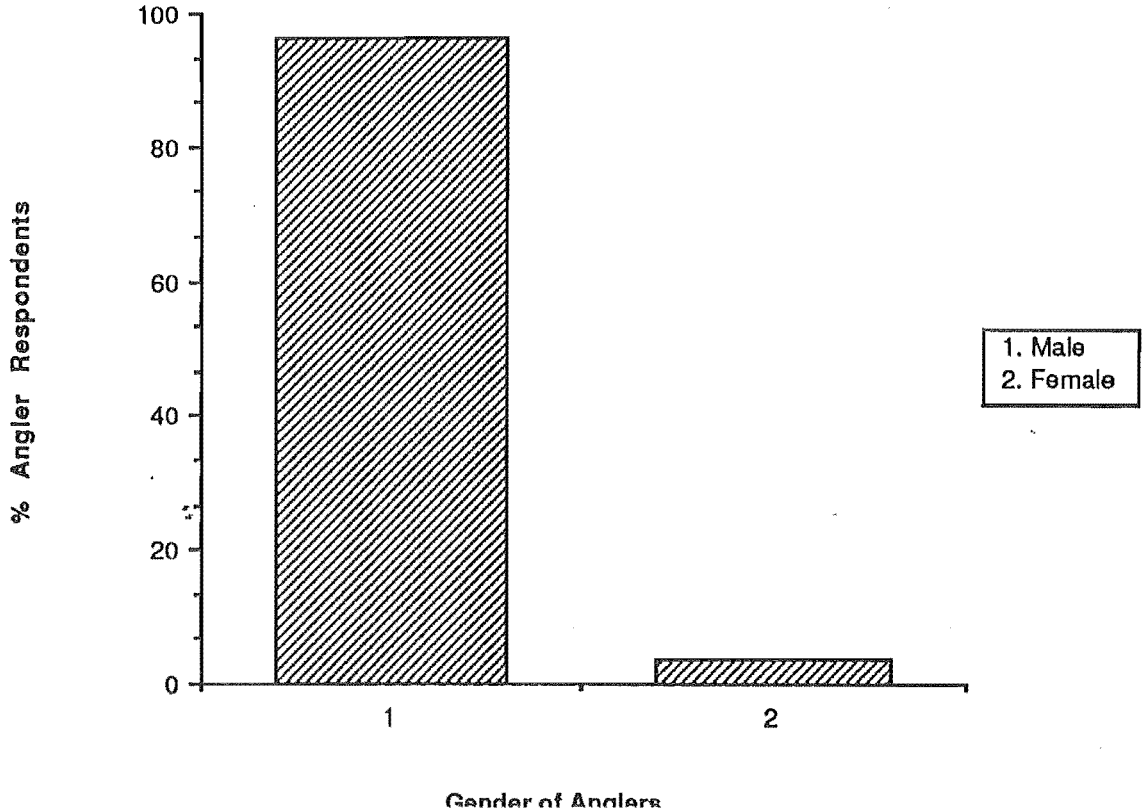


Figure 6: Gender of Local Angler Respondents, 1989/90



in the future. Interestingly guided overseas female anglers are common as noted in chapter four, possibly indicating higher rates of female participation in freshwater angling overseas. However such females may be participating as "companions" rather than as anglers during such an overseas angling experience, and may not fish to the same extent when at home.

1d) Mobility

Respondents were asked to rate their own mobility level from a choice of three catergories (fig.7). The question was asked in order to assess the ability of anglers to fully utilise the fishing resources within Nelson. It is likely that mobility has different meanings for each individual.

Mobility refers to the ability of an individual to move about under his/her own energy, specifically walking ability, whilst on streamside.

Most respondents appeared to be very active, with only a small number who had limited walking skills. On the surface it would appear that mobility has little influence upon an individuals decision to fish within Nelson. However those respondents with limited mobility may be the more persistent or keener group of low mobility individuals within the total population.

The Nelson angling District offers a wide variety of angling opportunities, however most angling locations require some degree of physical mobility, if only to gain access to the river. Many areas within the study area though, are suitable for anglers with low mobility, but such areas are generally intensively fished. The nature of Nelson's rivers probably discourages low mobility anglers thus concentrating the remaining anglers that buy licences within the highly mobile group.

However, despite the fact that 80% of anglers were highly mobile, does not mean that they all practice semi-extensive angling methods, and cover large distances of water during a days angling. Many highly mobile anglers

indicated as a separate comment that although they were capable of walking or wading virtually anywhere, they didn't necessarily enjoy doing so.

1e) Previous Angling Experience

The respondents appeared to be a highly experienced group with well over half indicating that they had over ten years angling experience. The largest group indicated they had in excess of 21 years angling experience whilst the second largest group of respondents being relatively inexperienced anglers in the 2-5 year group (fig.8).

Only 5 first year anglers responded to the questionnaire. This unexpectedly low number is hard to explain although a single year catergory could not expect to illicit as many replies as the 5 year divisions in the other experience catergories. The 21 year plus experience catergory possibly gaining many replies because it could span up to 50-60 years angling experience.

This study's findings are in contrast to those of Smith (1989), who found that most anglers in his study group had under 15 years experience, with a steady decline in participants with increased experience. This possibly means that Nelson anglers are generally more experienced than anglers in some other angling Districts.

1f) Skill Level

Respondents were asked to indicate their skill level within a range of four categories. Most anglers were modest in their estimation of their angling skills with few anglers considering themselves either excellent or poor (fig.9).

Cross-tabulations between skill level and trout landed showed skill level was a significant aspect of angling success. Skill level is probably something that generally increases with angling experience, as any individual that remains a poor angler after many years fishing would probably discontinue angling due to a lack of success. However skill level is not solely a product of experience,

Figures 7 and 8:

Figure 7: Physical Mobility of Local Angler Respondents, 1989/90

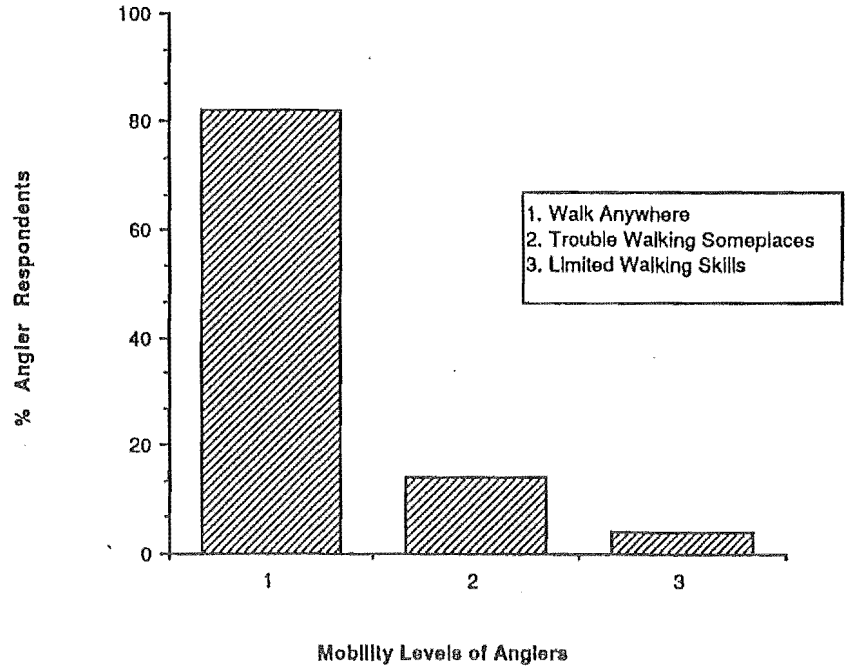
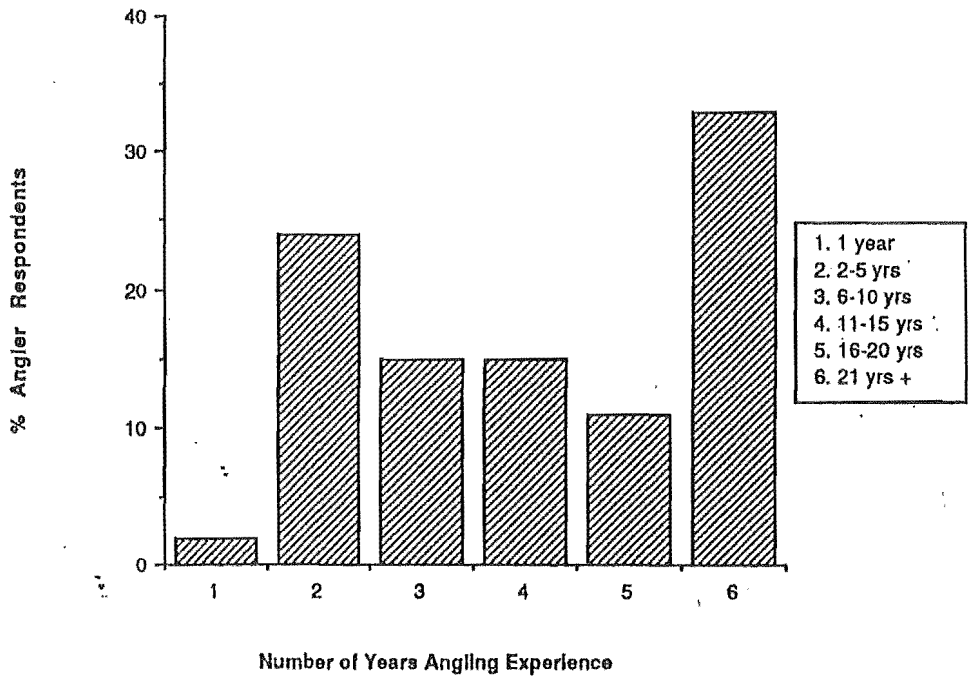


Figure 8: Previous Angling Experience of Local Anglers, 1989/90



as many anglers possibly fail to progress from good to excellent anglers, independent of the time they spend angling.

2) The Nature of the Fishing Activity

2a) Method

Anglers surveyed were asked to record their predominant angling method during the angling season.

Cross tabulations between the nominated angling methods showed that the majority of anglers used one method only (fig.10). Exclusive use of the upstream fly method accounted for most anglers while the second major group was that of exclusively spin-anglers. Angling combinations of upstream/ downstream fly and upstream fly/spinning were the next most significant groups. Methods such as trolling and bait fishing were seldom used in Nelson during the 1989/90 season.

These figures are similar to those determined by Graynoth et al(1974). Graynoth found that the following groups, comprised the following percentages of anglers surveyed: fly anglers 49.2%, spinning anglers 36.2, bait anglers 5.8%, and trolling 5.1%.

The results of Toynbee (1974), are different from this study and that of Graynoth because Toynbee took a broad scale sample, examining junior and also weekly/daily licence holders. As a result Toynbee showed higher proportions of methods other than fly fishing being used because he examined fewer adult whole season anglers. Adult anglers generally have the most angling experience and are ranked higher on Bryans (1977) recreational specialisation continuum. Therefore it is not unexpected that they would have graduated from methods, such as spinning, that are more commonly participated in by beginning anglers.

Figures 9 and 10:

Figure 9: Skill Level of Local Angler Respondents, 1989/90

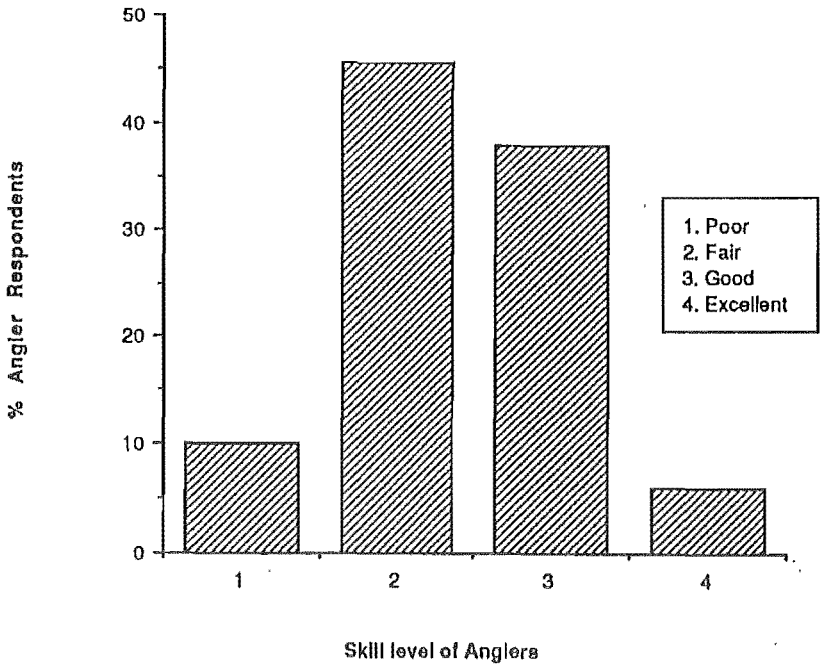
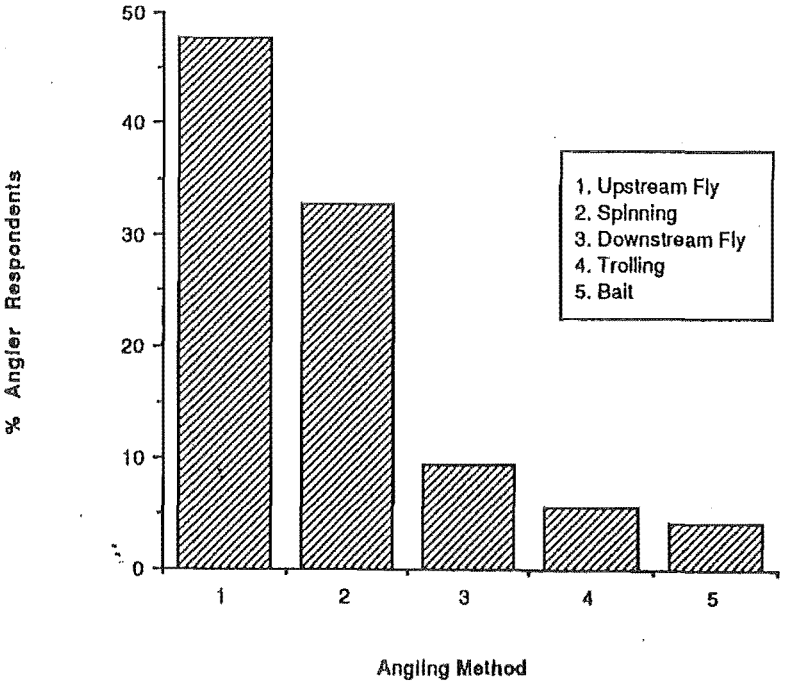


Figure 10: Angling Method of Respondents, 1989/90



2b) Days Spent Fishing

Respondents were asked to nominate the number of days that they had fished during the 1989/90 angling season. As this information was collected by category, the median figure of each category was used as the basis for further calculations. It was found that 208 anglers who fished under 25 days had accounted for 2464 days angling (fig.11). This group excluded 35 anglers who fished no days during the 1989/90 season.

Those anglers that fished on more than 25 days were asked to estimate their total number of days fished. This group of only 42 anglers accounted for 2049 angling days. These anglers made up only 14.7% of the total number of respondents yet fished 45.4% of all angling days. The number of days fished by this group ranged from 26-100, with an average of 48.8 days per individual angler.

These statistics show far greater levels of angling activity than those found by Toynbee (1974). The individual fishing the most days in Toynbee's 1973-74 study fished on only 34 days. Such an individual who fished on the same number of days in the 1989/90 study is still a high ranking angler, however 31 anglers still fished on considerably more days. At the other extreme 35 persons (12.15% of the sample) did not fish at all during the season. The reason for this is uncertain , perhaps such individuals bought a licence and never had the opportunity to fish or never took out a licence for the 1989/90 season.

In total 285 respondents fished on 4513 days which averaged 15.8 days per angler. However 62.8% of anglers fished under 15 days. On average, anglers who did some fishing in 1989/90 fished 17.8 days each. This is in stark contrast to Toynbee, who found that the mean number of days fished by male adult whole season licence holders was 8.6. This strongly suggests that such anglers fished much more in 1989/90 than they did 16 years ago, perhaps

more than doubling their fishing activity. Such changes in angler behaviour have strong implications for fisheries management.

2c) Travel Time

Most individuals were prepared to travel large distances to fish. Almost two-thirds of respondents indicated they were prepared to travel between 0.5-2.0 hours to fish (fig.12).

There was some confusion about whether travel time meant one way or both ways. The writer meant it to be interpreted as one way only, and it appeared that most respondents understood it in this way also.

The significance of travel time, however, depends on the location of angler residence. As most anglers originate from the Eastern catchments, where quality angling is less available, they are often prepared to travel quite large distances to obtain reasonable angling opportunity, whereas many anglers, living for example in the Buller and Motueka catchments, would feel less inclined to travel large distances. Cross tabulations show that the large number of individuals prepared to travel is characteristic of mainly Eastern Catchment anglers.

2d) Months Fished

Participation in angling was heaviest early on in the season and decreased as the season progressed. The only exception to this being November which had slightly more angling intensity than October, the opening month of the season (fig.13).

It appears that an enthusiasm factor encourages high angling usage early in the season, the enthusiasm of anglers declining throughout the season. The early season is also considered good for fishing because of generally higher water flows and less wary trout. Later in the season wary trout, low water flows and high water temperatures may affect catch rates dampening angler

Figures 11 and 12:

Figure 11: Days Spent Fishing by Angler Respondents, 1989/90

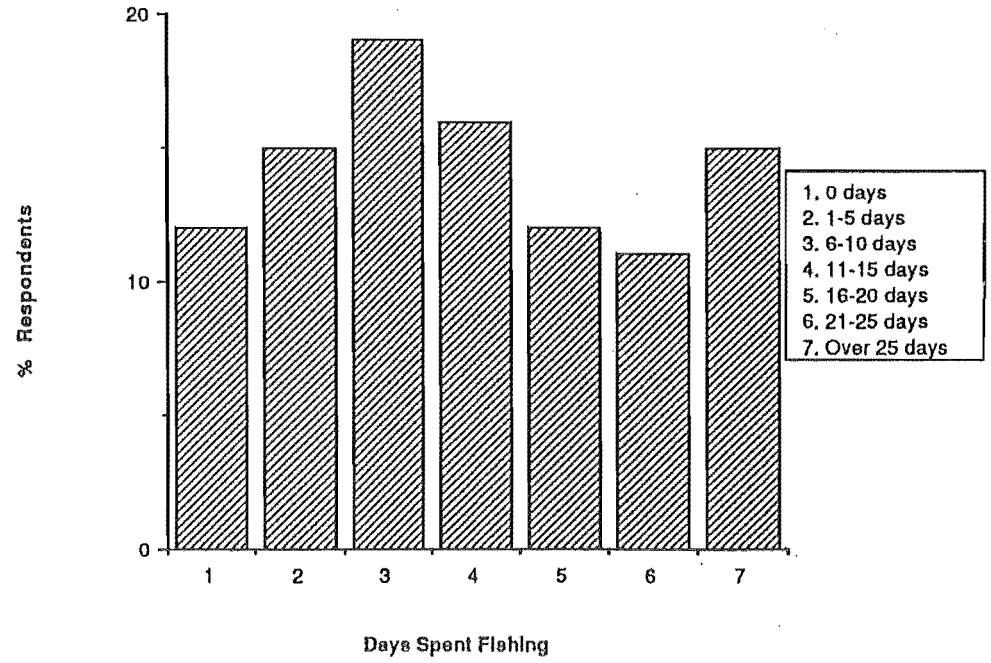
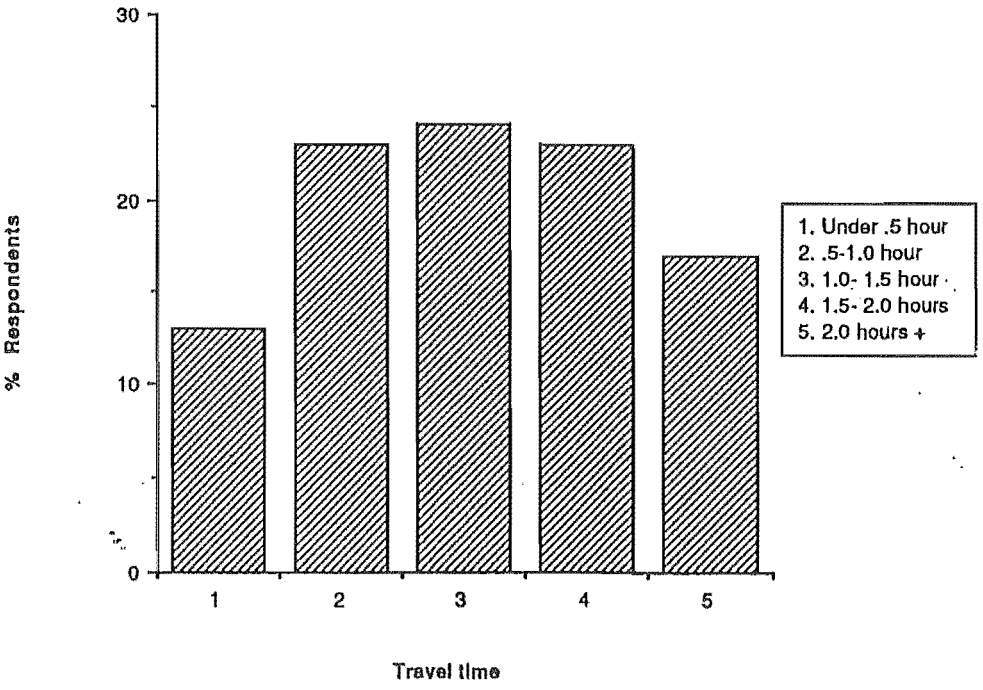


Figure 12: Estimated Time Anglers Were Prepared To Travel To Fish, 1989/90



enthusiasm and subsequent angling activity patterns.

The holiday season December-January was not a highly used period, in contrast to what might be expected, this may be due to holiday crowds and other recreationalists deterring anglers over this period. A limited amount of evidence, consisting of angler comments, is present to support this theory.

2e) Days of the Week Fished

Weekends proved to be the favourite fishing days for anglers, although week days were also important (fig.14). Generally week days increased in importance throughout the week from Monday to Friday, with Friday the most important week day angling day. This is possibly because of many people taking a day off work, in conjunction with a weekend to fish. However this explanation does not work with Mondays and Tuesdays which were the least fished days of the week. Saturday and Sunday though, accounted for over half of the respondents angling days.

Interestingly, many anglers indicated that all days of the week had the same angling importance to them. This response would depend on occupational circumstances. The high numbers of elderly anglers possibly goes some way to explaining this phenomenon, as being retired, they would be expected to have more choice on what days they went fishing. However a holiday-maker could also be a candidate, for example if s/he only fished for five days for the season during a week's holiday.

Weekend angling days are easier to explain as they are the major periods of time that most individuals have available on which to fish.

Figures 13 and 14:

Figure 13: Distribution Of Monthly Angling Effort Over The 1989/90 Season

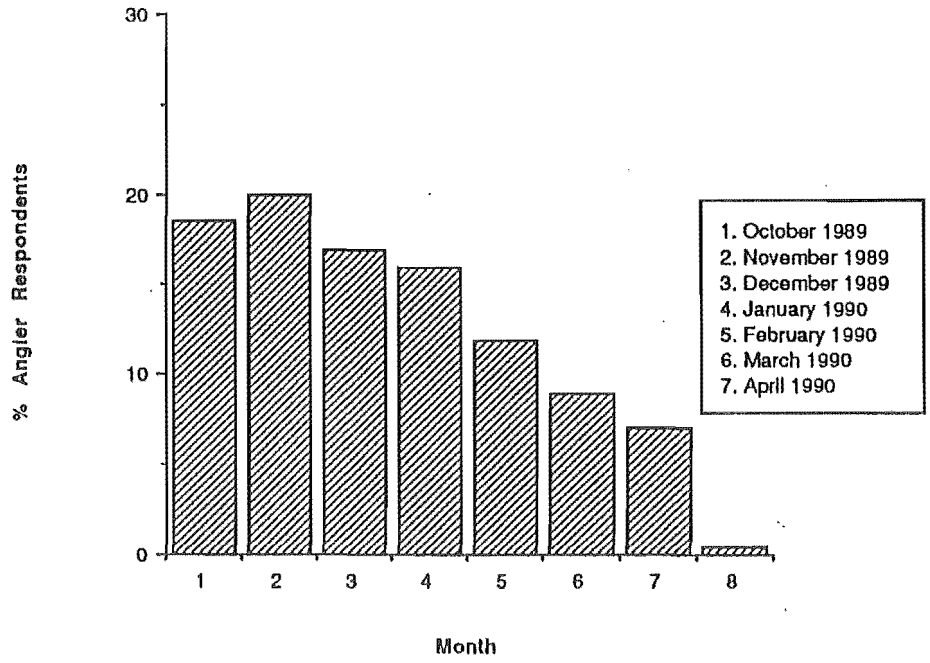
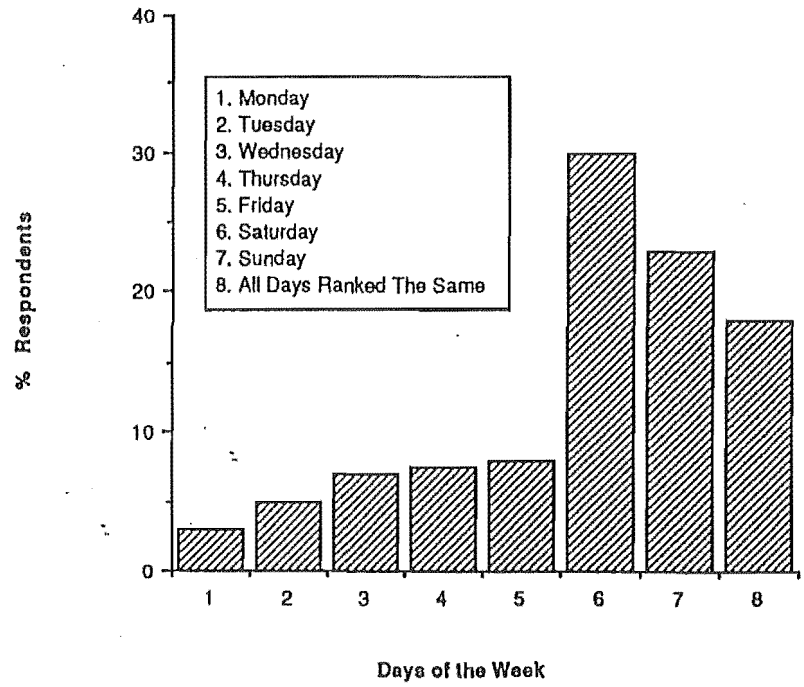


Figure 14: Distribution Of Angling Effort Over Week Days And Weekends, 1989/90



2f) Start Time/ Time Spent Angling

In terms of what respondents considered a normal angling day, most anglers began fishing in the morning hours, with 163 anglers (69.06%) starting fishing between 6-10am (fig.15). These anglers fished a mean of about 6 and 3/4 hours each before finishing. Relatively low numbers of anglers began fishing during the early afternoon with an increase toward late afternoon. Fifty anglers began angling between 4-8pm. These anglers however spent less time fishing than those who started in the morning: between 2-4 hours on average. This is probably because darkness calls a halt to fishing for most anglers, whereas during the daytime the anglers starting in the morning have more time available to them.

2g) Nature of Fishing Activity:

Participants were asked their participation in the categories of daytrips, overnight/weekend trips or multiple day trips (e.g. camping/backcountry trips). Angling outings of a one day duration had as expected, high rates of participation. Two thirds of questionnaire respondents rated their season's angling expeditions as having had high to medium levels of daytrips (fig.16), while relatively few respondents regarded daytrips as a low or nil factor within their angling activity. The individuals using few daytrips generally fished a low number of days during the 1989/90 season, however some may have fished during annual holidays or from a weekend retreat such as a bach etc.

The high frequency of daytrips can be explained by individuals being able to have a day's recreation, then return to the comfort of their home and families. Many individuals also have trouble finding a lot of time to fish, therefore a day is a realistic time period to set aside for angling purposes.

Overnight and weekend trips were less used than daytrips, however about 30% of respondants rated their angling trips as being within the high to medium catergories. Over two thirds of participants rated this form of activity

Figures 15 and 16:

Figure 15: Time Of Day That Angler Respondents Began Fishing, 1989/90

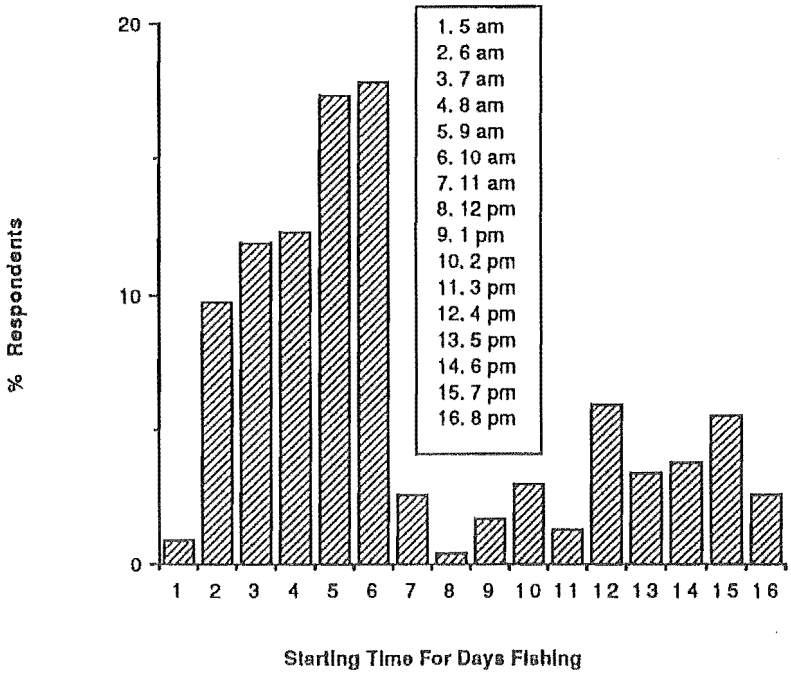
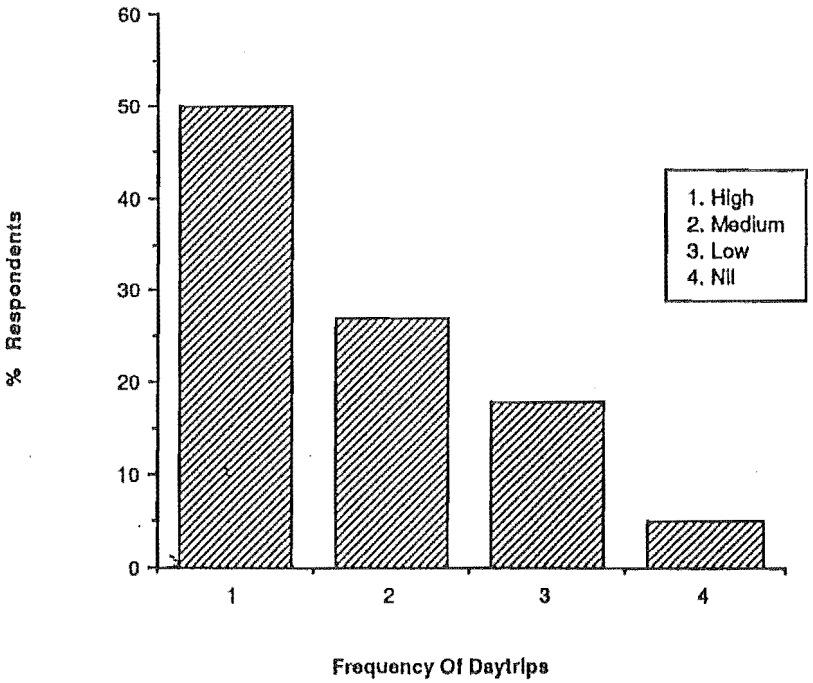


Figure 16: Frequency Of Angling Trips Of One Day In Duration, 1989/90



Figures 17 and 18:

Figure 17: Frequency Of Angling Trips Of An Overnight Or Weekend Duration, 1989/90

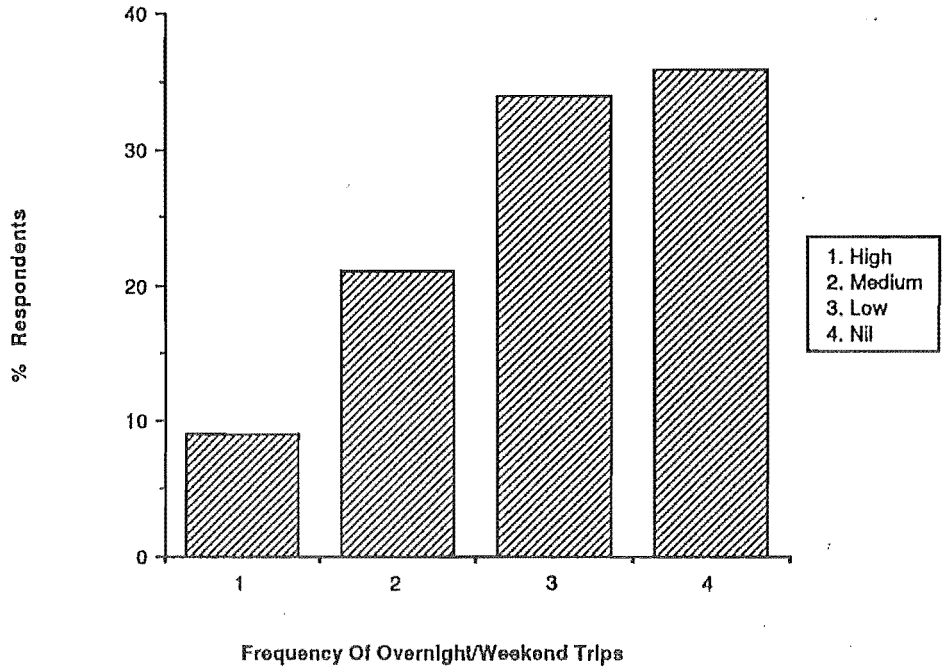
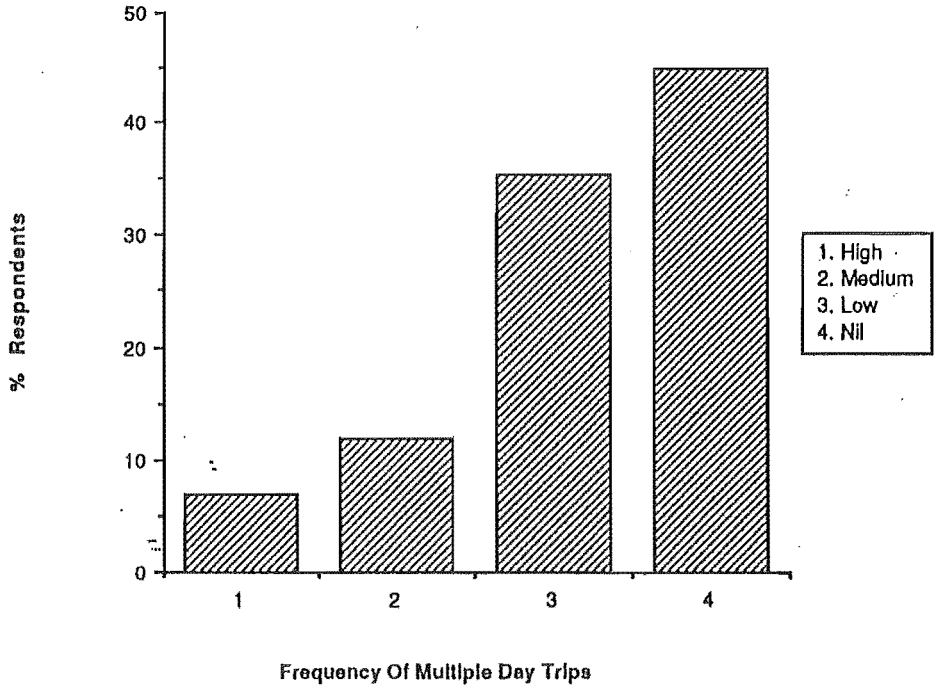


Figure 18: Frequency Of Angling Trips That Were Of A Multiple Day Duration



to be of low to nil importance to their fishing (fig.17).

Multiple day trips included all angling trips of greater than one weekend in length. This catergory was meant to include all extended camping or backcountry/wilderness angling excursions.

As expected, few anglers rated this form of angling activity as a major proportion of their trout fishing. Only 20% of anglers rated such trips to be of high to medium importance, while 80% of anglers had low to nil experiences of this nature during the 1989/90 season (fig.18).

3) The Angling Catch

3a) Estimate Bias

With any attempt to measure angling catch rate there is likely to be significant bias. Smith(1989) summarised likely sources of bias associated with estimates of angling catch. These factors are:

i) Recall bias with anglers unable to accurately remember their catch. This may apply to varying degrees depending on the number of fish caught by each angler or in each fishery. Included in this category is the rounding off of data causing a disproportionately high frequency of multiples of 5.

ii) Non-response bias: estimates of catch are from respondent results only. It appears from the use information that non respondents fish less and travel less to fish. It is likely non-respondents are less successful and the estimate of catch would therefore be an overestimate.

iii) Incorrect reporting: it is also possible that when asked something after the event, anglers remember details somewhat more favourable than they actually were. Called the "prestige bias", this would also lead to a high estimate of catch.

iv) Multiple Seasonal Bags: where respondents reported the sum of their fishing partners and their own catch.

This is all likely to mean that the catch estimate is significantly higher than the the average catch per angler. Given that the bias is relatively consistent, the average catch per angler per season broadly categorises anglers by catch success.

3b) 1989/90 Estimates of Trout Caught By Survey Respondents

Although two species of trout are present within study area, the brown trout is undoubtedly the dominant species forming the majority of the anglers catch and sustaining most of the angling pressure.

Rainbow trout are present in few localities and in sparse numbers relative to brown trout throughout the district.

The 253 active anglers surveyed within the questionnaire, recorded a total of 4786 trout landed during the 1989/90 season.

Of these trout 4298 (89.8%) were brown trout whilst the remaining 488 fish (11.2%) were rainbows. This 8:1 ratio of rainbows to brown trout is uncharacteristically high for an angling survey of the Nelson District. This can be probably explained by a large proportion of the rainbows being caught outside the District, for example the Rai-Pelorus area (Marlborough) and the Central North Island lakes which were fished by anglers resident within the Nelson District. However this study has no data to confirm this as it did not survey catch rates in individual waters.

The number of fish caught by individuals in the sample varied considerably. The greatest number caught during the season by one angler was 250, whilst at the other extreme 28 (9.8%) of respondents failed to catch any trout at all. The number of anglers in any one catch group, declines progressively as the trout numbers landed increase. The only deviation from this general trend are

Figures 19 and 20:

Figure.19: Total Trout Landed By Local Angler Respondents, 1989/90

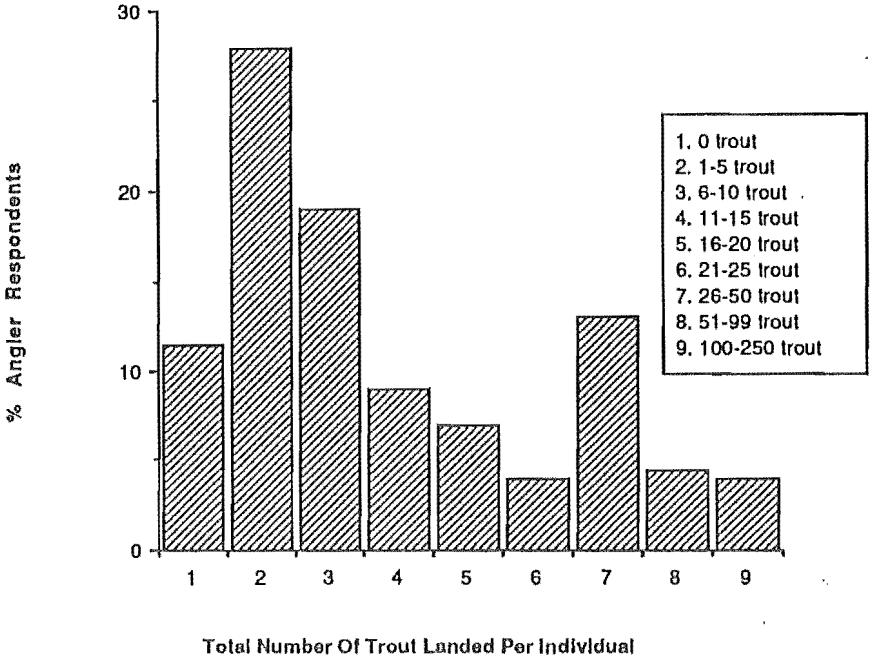
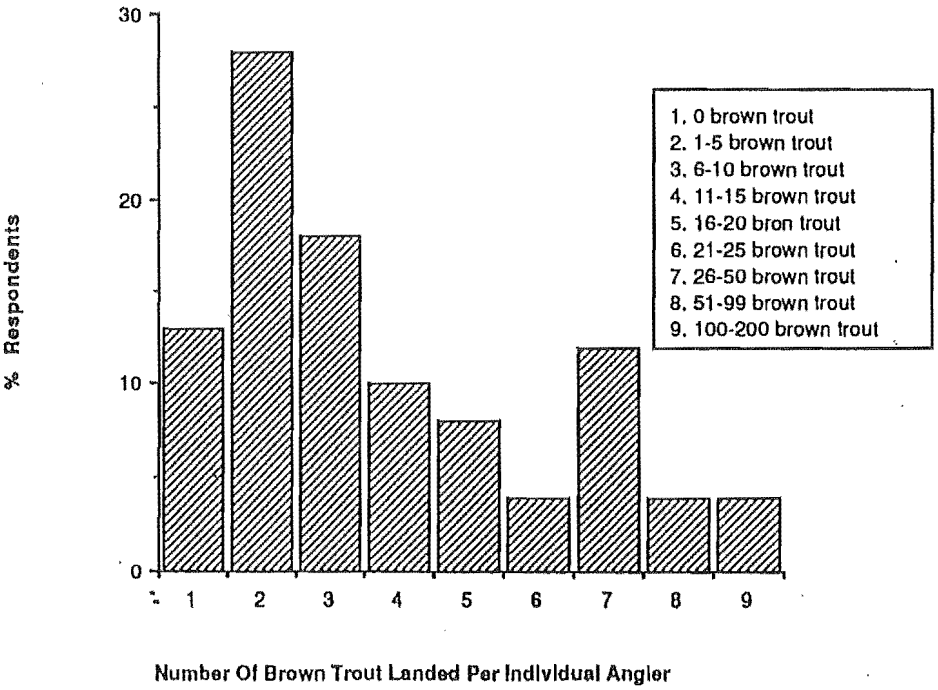


Figure 20: Total Brown Trout Landed Per Individual Angler, 1989/90



the anglers who landed 26-50 trout during the season (fig.19). On average each angler caught 16.62 trout.

Differences in catch rates between trout species are visible in figures 20 and 21. Catches of brown trout show that a quarter of the anglers landed between 1 and 5 brown trout. A small number of anglers landed over 50 brown trout during the season. Nine of these anglers (3.13%) landed between 50-100, whilst another nine skilled anglers landed between 100-200 brown trout.

The number of rainbows landed, in contrast to the browns, has a much narrower range of distribution among anglers. Almost three quarters of anglers failed to land a rainbow trout during the season, while 20% of anglers landed between 1 and 5 rainbows. Six individuals however landed between 26 and 50 rainbow trout. These statistics are not unexpected as most of the Nelson fishery contains no rainbow trout and anglers who caught any significant numbers of rainbows generally caught them outside the District.

Non-response rates were under 15% for both rainbow and brown trout catergories, which gives a relatively high confidence rate for reported catch rates. The non-response rate possibility indicates that some anglers were embarrassed to record their catch for the season. These individuals probably had low catch rates.

3c) Catch and Release

The concept of catch and release is often a contentious one amongst recreational anglers. However over the last decade it has become something of a fashion. Many of the more skilled anglers concerned at possible depletion of trout stocks, have turned to returning unwanted trout to the water alive, in order to conserve and "recycle" trout stocks.

Unfortunately catch and release has become a form of purism, with many practicing members condemning those who do not release a proportion of

Figure 21 and 22

Figure 21: Total Rainbow Trout Landed Per Individual Angler,1989/90

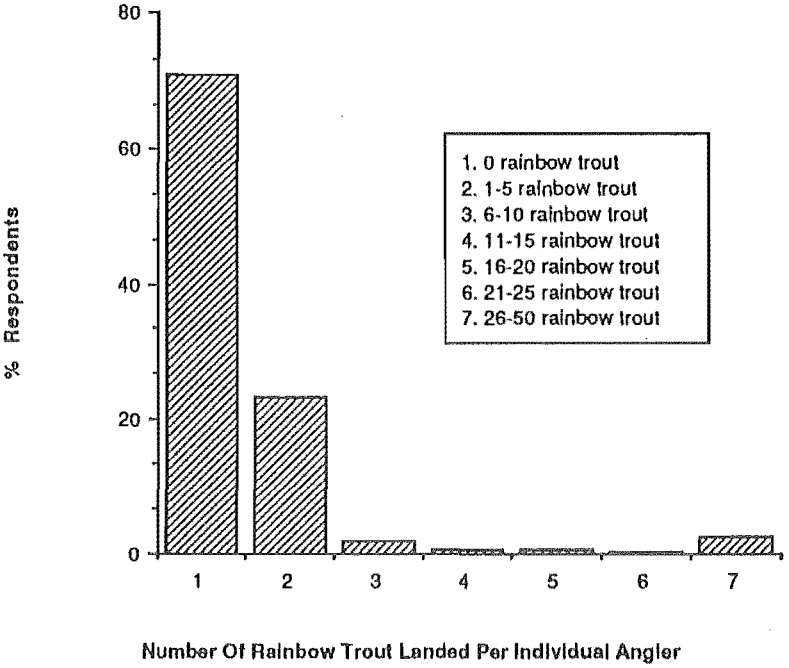
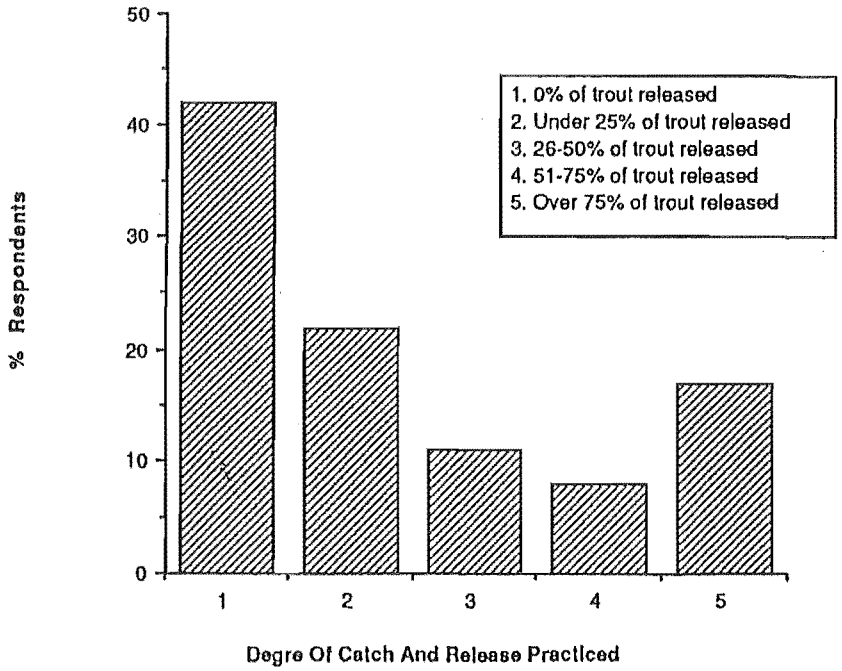


Figure 22: Levels Of Catch And Release Practiced By Anglers Living Within The Study Area



their trout. The reverse also occurs whereby some anglers become defensive of their right to kill trout and object to catch and release anglers telling them how they should behave.

From figure 22, it can be seen that most anglers kill a large proportion of the trout that they land, with two-thirds of anglers killing at least half the fish they land. However it is also evident that there are significant numbers of anglers who do practice catch and release on a major basis with about 20% releasing over half of the trout they land, with another 15% releasing over 75% of the trout they landed.

A cross-tabulation between total trout landed and the practice of catch and release showed that the majority of anglers who kill their catch generally have relatively low levels of angling success. If the reported catch and release statistics are correct, then about 40% of the total catch was killed during the 1989/90 angling season, this means that 60% of the total catch was released.

In conclusion then, it can be seen that Nelson anglers have a number of personal and angling characteristics which are important to their fishing behaviour. Such factors are important in determining the actual patterns of use, the possible impacts such anglers may be having on a fishery, and in determining fisheries management practices. It is the role of the next chapter to examine the locational and distributional aspects of actual patterns of angling activity, in regard to the findings of this present chapter.

CHAPTER SIX:
THE LOCATIONAL AND DISTRIBUTIONAL ASPECTS OF PATTERNS OF ANGLING ACTIVITY.

Any study examining the impact of a number of user groups on a particular resource must first explore the nature of user group activities, the spatial patterns, and the intensity of use such a resource experiences. Chapter five explored the nature of Nelson recreational angler behaviour, however it did not examine the spatial and locational aspects of fishing by such anglers. Individual angler behaviour is important in any assessment of angling impact, but how this translates into spatial use of a fishery is equally important. Within any fishery, spatial usage by anglers would be expected to vary and certain areas would be expected to be fished more than other locations. It is the role of this chapter to examine such spatial aspects of angler behaviour, incorporating the intensity of angling use to determine the relative usage of angling waters fished by survey respondents,both within and beyond the study area. The chapter concludes with an examination of which water bodies were least and most valued by local anglers and the reasons for this.

1) Spatial Patterns of Local Angler Use.

Survey respondents fished in excess of 120 rivers and lakes during the 1989/ 90 angling season. The majority of these waters were outside the Nelson Fish and Game District although respondents fished on at least 46 waters within the District.

The total number of days angled for the season by respondents was 5530, as recorded by the number of days fished on each angling water, that anglers indicated that they had fished. An earlier category that showed only the number of days fished by each individual angler underestimated this total. Of

these 5530 days, 4517 (81.7%) occurred within the Study area, whilst 1013 (18.3%) were outside this area.

2) Distribution of Angling Activity Patterns Within the Study Area.

Angling activity can be subdivided into the four divisions, namely Buller, Motueka,Eastern and Golden Bay (Table 6.1).

Table 6.1. Days Fished Within The Study Area By Catchment Areas.

Area	Days Fished	% Within District
Motueka	2044	45.3%
Buller	1663	36.8%
Eastern	605	13.4%
Golden Bay	205	4.5%
Total	4517	100.0%

The Motueka catchment area is the most fished area within the study area, closely followed by the Buller. The Eastern and Golden Bay catchments are relatively little fished at only 17.9% of total angling effort.

These statistics differ to those of Toynbee (1974) who found that the Buller region was the most heavily fished despite the fact that such waters are amongst the most distant from the majority of anglers in the District. The Eastern rivers in this study were relatively more important than Toynbee found, while the Golden Bay rivers were less important. Such differences between studies are possibly due more to differences in the sampling population than to changing trends in angling. Each of the four catchment regions will now be examined individually, as important spatial variations in angling use within each region occur.

2a) Motueka Catchment Area

The mainstem Motueka and three tributaries were among the major areas of angling effort within the catchment during the 1989/90 season. The Riwaka, a small independent coastal river, included within the Motueka catchment area, also sustained significant levels of angling effort (Table 6.2).

Table 6.2: Angling Activity within the Motueka Catchment Area

River	No.Resp.	%Tot.Resp.	Tot.D.F.	%Mot.DF	%Nel.DF
Motueka(b.Wang.)	144	56.9	1082	52.9	23.9
Wangapeka	83	32.8	295	14.5	6.5
Motueka(a.Wang.)	85	33.6	265	12.9	5.9
Riwaka*	44	17.4	151	7.5	3.3
Motupiko	44	17.4	108	5.2	2.4
Baton	49	19.4	78	3.9	1.7
Pearse	19	7.5	22	1.0	0.5
Graham	12	4.7	17	0.8	0.4
Tadmor	8	3.2	14	0.7	0.3
Rainy	9	3.5	11	0.5	0.2
Other Motueka	1	0.3	1	-	-
Totals			2044	100.0%	45.3%

Key to titles

*	Independent river within defined catchment area
No. Resp.	Number of Respondents
% Tot.Resp	Percentage (%) of the total number of respondents
Tot.D.F	Total days fished
%.Mot.D.F	Percentage of days fished within the Motueka catchment area

%.Nel.DF Percentage of days fished within the total Nelson study area

Note

These same titles will be used for the following three tables.

Of the 2044 angling trips in the Motueka catchment, the majority occured on the mainstem Motueka and one tributary, the Wangapeka. Over half of angling activity within the Motueka Catchment area occurred on the Lower Motueka below the Wangapeka confluence. This stretch of river also had the largest number of "repeat visits" by respondents. Nearly 60% of survey respondents fished on this stretch of river at last once during the 1989/90 angling season.

Tributaries of the mainstem Motueka river that experienced significant levels of angling activity,apart from the Wangapeka, were the Motupiko and the Baton.

2b) Buller Catchment Area

The Buller catchment came second to the Motueka, in terms of angling effort within the study area, with 1663 angling trips (table 6.3).

The major areas of angling activity were firstly on the mainstem Buller, both above and below Kawatiri Junction, followed by Lakes Rotoiti and Rotoroa, known collectively as the Nelson Lakes. These areas were also fished by the largest number of respondents.

A number of other tributaries also sustained significant angling activity. The following rivers,in decreasing order of importance, were also fished over 50 days each by respondents: Gowan, Maruia, Sabine, Mangles, Owen, Travers, and Matakitaki.

The Upper Buller (above Kawatiri Junction) incurred the most angling activity of any river or lake within the Buller catchment. On a regional basis, the Upper Buller river accounted for 7% of total angling activity.

Table 6.3: Angling Activity Within the Buller Catchment

River/Lake	No.Resp.	%Tot.Resp.	Tot.DF	%Bull.DF	%Nel.DF
Buller(a.Kawatiri)	98	38.7	317	19.1	7.0
Buller(b.Kawatiri)	78	30.8	235	14.2	5.2
Lake Rotoroa	36	14.3	216	12.9	4.8
Lake Rotoiti	52	20.5	161	9.6	3.6
Gowan	49	19.3	117	7.1	2.6
Maruia	41	16.2	114	6.9	2.5
Sabine	34	13.4	78	4.7	1.7
Mangles	29	11.5	75	4.6	1.6
Owen	32	12.6	73	4.4	1.6
Travers	23	9.1	66	3.9	1.4
Matakitaki	25	9.8	59	3.5	1.3
Tutaki	22	8.6	45	2.7	1.0
D'Urville	24	9.5	45	2.7	1.0
Matiri	11	4.3	22	1.3	0.5
Other Buller	6	2.3	13	0.8	0.3
Glenroy	6	2.3	9	0.5	0.2
Howard	8	3.1	8	0.5	0.2
Lake Daniels	4	1.5	6	0.4	0.1
Hope	4	1.5	4	0.2	-
Totals			1663	100.0	36.8

2c) Eastern Rivers Catchment Area

This area includes the catchments of the Waimea, Maitai, Wakapuaka and Whangamoa. The Waimea is the major catchment in geographical area with the other three rivers being small coastal streams. Out of a total of 605 angling days, 36.2% were on the mainstem Waimea (table 6.4)

Table 6.4: Angling Usage Within the Eastern Catchments

River	No.Resp.	%Tot.Resp.	Tot.DF	%East.DF	%Nel.DF
Waimea	56	22.1	219	36.2	4.8
Wakapuaka*	21	8.3	84	13.9	1.9
Maitai*	28	11.1	81	13.4	1.8
Wairoa	32	12.6	68	11.2	1.5
Wai-iti	11	4.3	59	9.7	1.3
Whangamoa*	17	6.7	47	7.8	1.0
Lee	14	5.5	37	6.2	0.8
Roding	5	1.9	10	1.6	0.2
Total	184	-	650	100.0%	13.4%

The Wakapuaka stream was the second most used used river within the Eastern Area at 13.9% of angling days. This percentage may well be higher as this writer is certain that many anglers confused the little fished Whangamoa stream with the Wakapuaka stream, especially as both flow out either side of the Whangamoa hill. Therefore the Whangamoa stream ranked here as number six, may actually occupy a lower position than this within the Eastern catchment classification.

Obviously Nelson anglers viewed the Eastern area as less attractive for fishing despite its proximity to the major population areas, preferring to travel elsewhere to fish.

2d) Golden Bay Catchment Area

Like the Eastern catchments, the Golden Bay trout waters were relatively lightly fished, compared with the Buller and Motueka areas. Respondents indicated that they had fished only 205 days there during the season (table 6.5)

Table 6.5: Angling Usage Within the Golden Bay Catchment Area

River	No.Resp.	%Tot.Resp.	Tot.DF	%Gold.DF	%Nel.DF
Aorere*	27	9.4	72	35.1	1.5
Takaka	21	8.3	48	23.1	1.0
Cobb	19	7.5	37	18.0	0.8
Cobb Reservoir	15	5.9	26	12.7	0.6
Other	6	2.3	15	7.3	0.4
Anatoki	3	1.1	7	3.5	0.2
Waingaro	0	0	0	0	0
Total	91	-	205	100.0%	4.5%

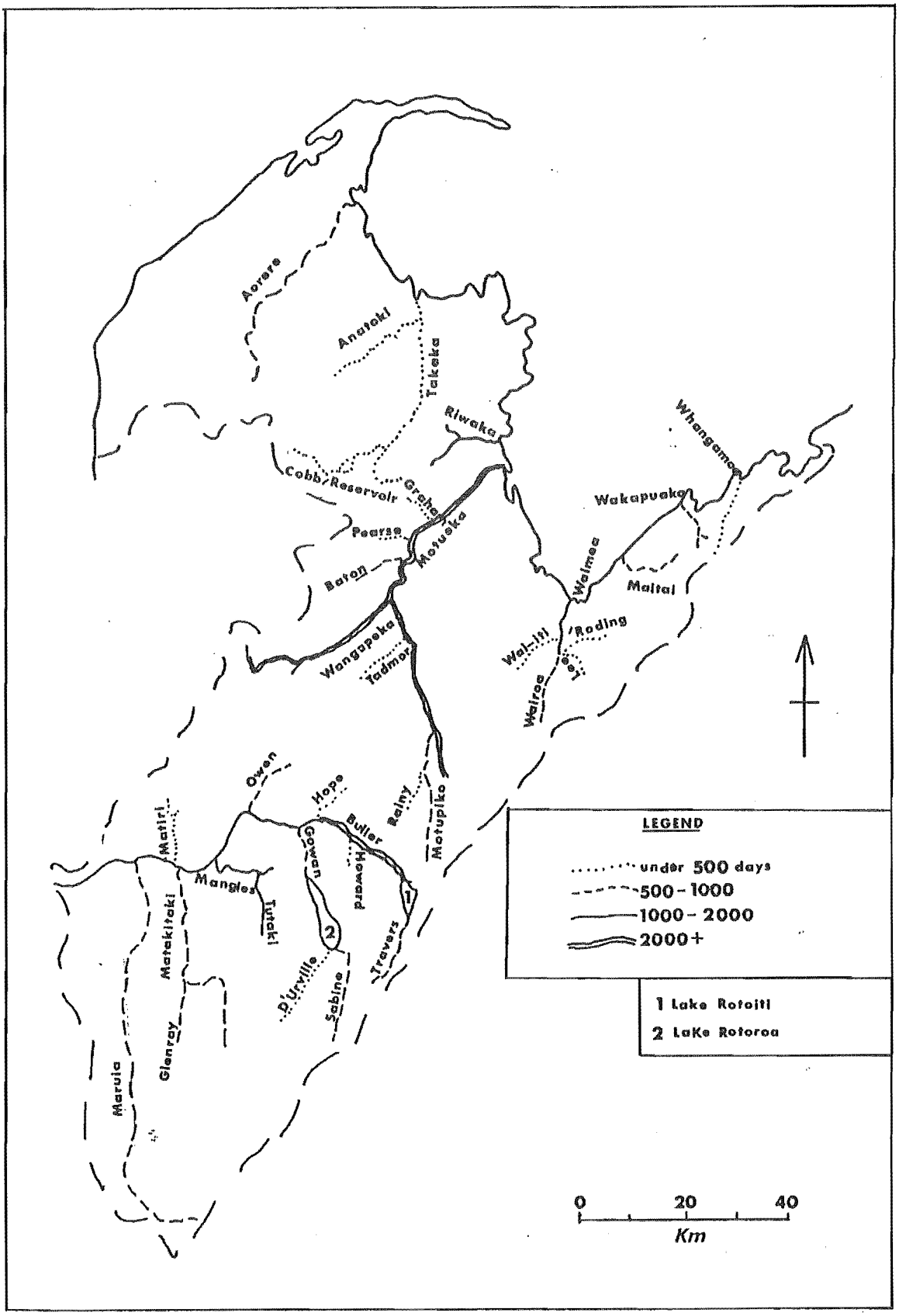
The Golden Bay catchment refers to the two major catchments of the Aorere and Takaka rivers, of which the Aorere was the most heavily fished, followed by the Takaka river and its tributaries, the Cobb river and Cobb reservoir. Like the Eastern catchments, relatively few respondents fished within the Golden Bay. The reason for this may be the Takaka Hill, which may act as a geographic barrier between the Golden Bay and the rest of the Nelson Province. In addition, the rivers are generally regarded as providing poorer fishing than many other waters within the study area

Total patterns of angling use on a regional scale is shown in figure 24. This map reinforces the importance of the Motueka and Buller Catchments to Nelson.

3) Distribution of Angling Activity Patterns Outside the Study Area.

Although most fishing by Nelson anglers occurred within the study area, there was also significant amounts of angling activity outside this region. During the 1989/90 angling season, respondents recorded a total of 1013 days outside of the region or 18.3% of total angling effort. Toynbee's result (1974,p.48) for

Figure 24: Total Patterns Of Angling Activity Within The Study Area By Questionnaire Respondents (Days Fished)



the 1973/74 angling season was 11%.

Over half of the respondents fished outside of the study area, however only 8.37% of these individuals fished more than 50% of their angling trips outside of the district (fig.25).

The regions of Marlborough, and the West Coast are particularly important in regard to this angling activity. The West Coast is included within the new West Coast Fish and Game District, with Marlborough being included within the new Nelson/Marlborough Fish and Game District.

The rivers of Marlborough are within easy daytrip range of many Nelson-based anglers. For example the Rai river is within one hour's drive of Nelson city, with the Wairau river taking about an extra half hour. Trips further afield (e.g. West Coast) would almost certainly have been associated with weekends or holidays in such areas.

Marlborough generated 49% of total angling activity directed outside the Nelson District, followed by the West Coast at 31.4%.

Nelson anglers were active anglers fishing rivers and lakes throughout the North and South Islands, with one individual also fishing in Tasmania, Australia .

The regions of Marlborough and Westland, and their importance to Nelson based anglers will now be examined more thoroughly:

3a) Marlborough

Two catchment areas within Marlborough are of greatest importance to Nelson anglers, these are the Pelorus and the Wairau. This is probably a function of travel time coupled with the angling opportunity available. These catchments can be further subdivided to ascertain rivers of importance to Nelson anglers (Table 6.6)(fig.26).

Figure 25:

Figure 25: Proportion Of Fishing Outside The Study Area By Nelson Anglers, 1989/90

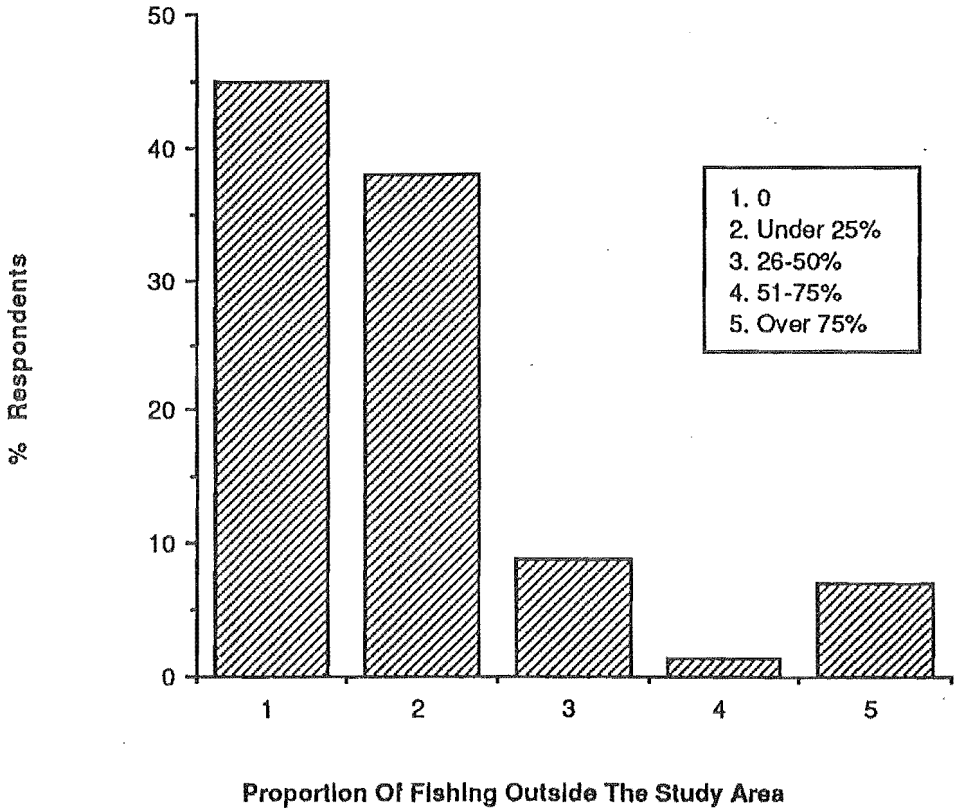


Figure 26: Angling Use Of Marlborough Rivers By Nelson Anglers As a Percentage Of Total Angling Outside The Nelson Study Area

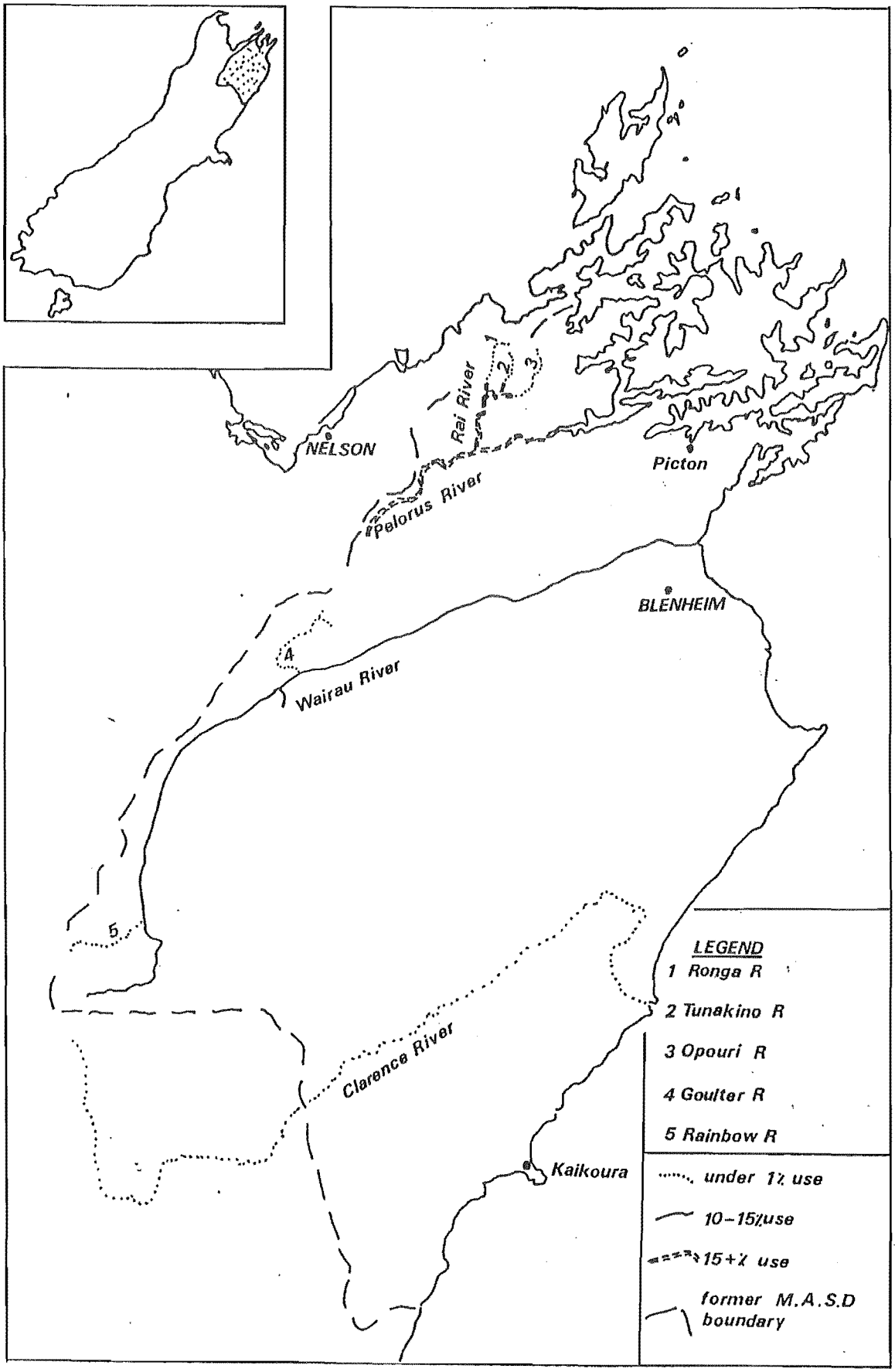


Table 6.6: Angling Usage Within Marlborough By Nelson Anglers.

River(s)	No.Days Fished	%Angling Outside District
Rai	192	18.9
Opouri/Tunakino/Ronga	30	2.9
Pelorus	153	15.2
Total Pelorus system	375	37.0
Wairau	106	10.4
Rainbow	2	0.2
Goulter	4	0.4
Total Wairau system	112	11.0
Clarence	9	0.1
Total Marlborough	496	49.0

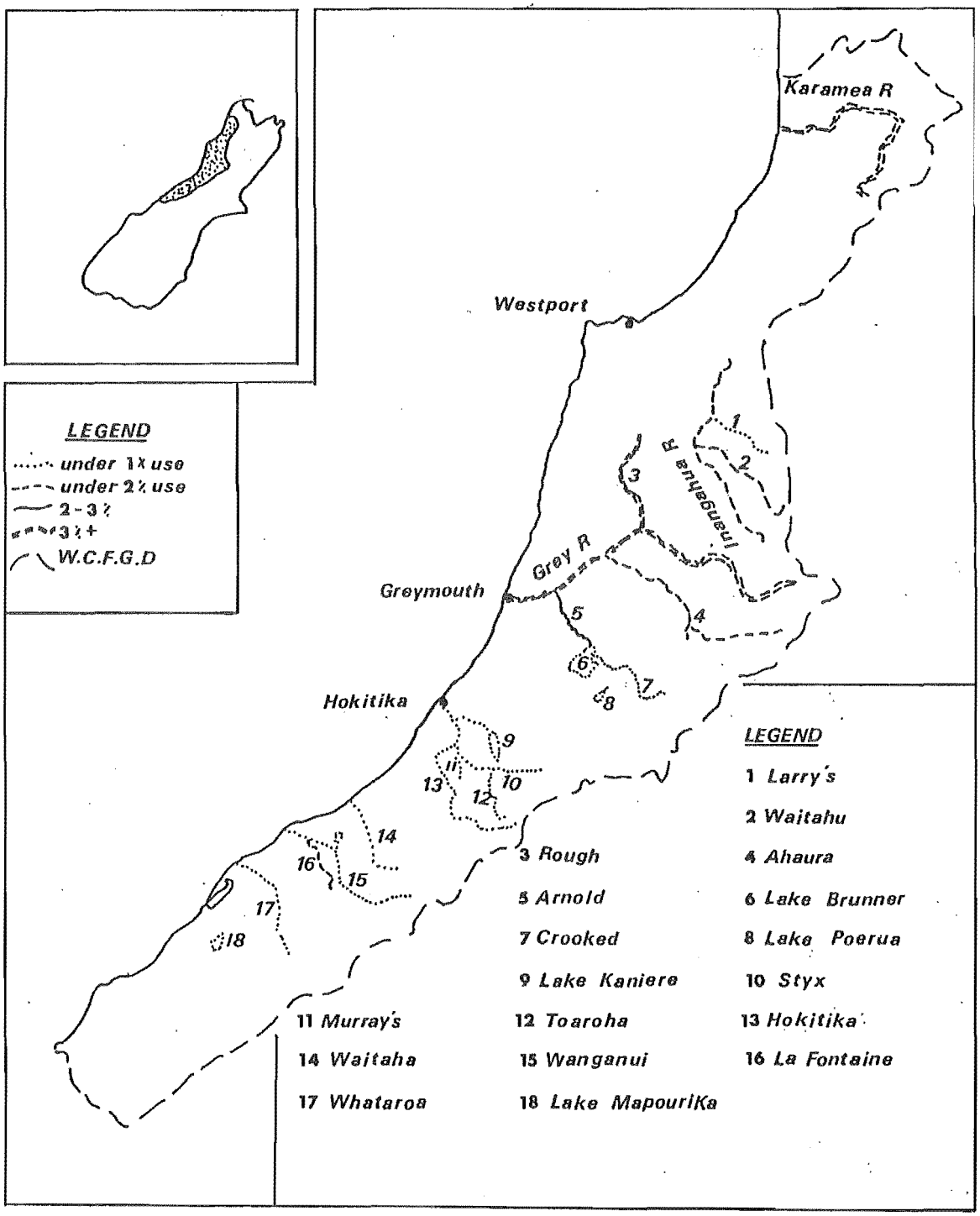
The Wairau river and mainstem Pelorus, with it's tributary the Rai, are the most important fishing rivers for Nelson anglers.

Other catchments within the Marlborough region are relatively unimportant to Nelson anglers, for example the Clarence catchment generated only 9 angling days in total.

3b) West Coast

The West Coast is also important to Nelson anglers accounting for over 30% of angling effort directed outside the Study area.

Figure 27; Angling Use of West Coast Waters By Nelson Anglers As A Percentage Of Total Angling Outside The Nelson Study Area



The Grey river was the most fished area by Nelson anglers in 1989/90 (fig.27). Use of the North West Nelson rivers by a number of respondents is indicative of the enthusiasm of many anglers, the only access to this area being by foot or helicopter (table 6.7).

Table 6.7: Angling Usage Within the Westland Fish and Game District.

Region/River(s)	Total Days Fished	%Angling Outside District
North Westland		
Grey	38	3.8
Big Grey/Rough	39	3.8
Ahaura	18	1.8
Arnold	23	2.3
L.Brunner/Poerua,	12	1.2
Total Grey Catchment	130	12.8
Inangahua	15	1.5
Larry's Creek	10	0.9
Waitahu	17	1.7
Total Inangahua Catchmen	42	4.1
NW Nelson Wilderness Area		
Karamea	46	4.5
Crow/Leslie/Ugly/Roaring lion	32	3.2
Total Karamea Catchment	78	7.7
South Westland		
Hokitika	8	0.7
L.Kaniere/Mapourika/Ianthe	5	0.5
Wanganui	3	0.3
La Fountaine/Murray	30	2.9
Whataroa/Other	18	1.8
Toeroa/Styx	4	0.4
Total South Westland	68	6.6
Total All Westland	319	31.4

The area defined as South Westland (south of Hokitika), was fished more than expected given its distance from the Nelson Province. The Inangahua river and its tributaries were fished on only 42 days. This was suprising as the Inangahua catchment is well known for the large brown trout it often produces. The Inangahua system is the closest West Coast area to Nelson anglers in regard to travel time so it was expected that it would have been fished more. It is entirely possible that many anglers were reluctant to name their angling activites within this area, to avoid publicising the area to other anglers.

It can be seen then that Nelson anglers fish a wide variety of waters for trout, both within, and beyond the Nelson District. The number of angling days fished in each location has given some indication of angling popularity, however there are many other ways of classifying relative angling value. For example anglers may highly value a particular water above others, even if it does not receive high angling usage. Angling popularity for a certain water does not necessarily mean that it provides enjoyable fishing for all angling groups. Angling quality is a concept that will vary between anglers and may be hidden by analysis of the most intensively fished rivers.

In an attempt to find out the waters that Nelson anglers most and least enjoyed fishing in 1989/90 and the reasons for this, a special section was included within the postal survey to capture such data:

4) Most Enjoyed Rivers/Catchments of Nelson Anglers

Respondents were asked in the survey to write the name of the river or river catchment that provided their most enjoyable angling experience(s) during the 1989/90 season. The five rivers rated as providing the most enjoyable angling experiences were the Motueka, Buller, Wangapeka, Rai, and Pelorus (Table 6.8).

Table 6.8: The Five Most Enjoyed Rivers/Catchments By Nelson Anglers.

River/Catchment	Ranking	Respondents	%Tot.Resp.
Motueka	1	53	18.4
Buller	2	23	7.8
Wangapeka	3	16	5.5
Rai	4	9	3.1
Pelorus	5	8	2.8
Total		109	37.6

These five rivers occur within three catchment areas, Buller, Motueka, and Pelorus. Two of these areas, namely the Buller and the Motueka, with its tributary the Wangapeka, are contained within the Nelson angling District. The Pelorus river and its tributary the Rai, however,occur within Marlborough.

These rivers will now be examined, with the reasons for their popularity being analysed to ascertain individual characteristics of each river. Only the three major reasons cited by each respondent were included in the analysis (table 6.9)

When all responses are considered together, it becomes apparent that anglers especially value good access to a river. They also value rivers for their perceived proximity to their place of residence. These two factors probably have different meanings to anglers. Good access possibly refers to roading networks providing access to and alongside a particular angling location, as well as referring to the ease by which the angler can reach the

waters edge. Close to home is most probably a direct measure of travel time or distance. These two factors are not mutually inclusive as for example in the case of the Buller, which was valued by some anglers for its good access but it was not considered to be close to the anglers' place of residence.

Table 6.9: Major reasons for the Popularity of the Five Most Enjoyed Rivers

Reason	Motueka	Buller	Wangapeka	Rai	Pelorus	Total
Good Access	12	5	-	3	2	22
Close to Home	18	-	-	-	2	20
Good Catch Rate	19	-	-	-	-	19
High Fish Numbers	12	-	-	3	3	18
Good Water Type	-	8	4	4	2	18
Quality of Fish	-	9	4	-	2	15
Scenery/Environment	-	8	5	2	-	15
Good Fishing	-	-	5	-	3	8
Rainbow Trout	-	-	-	3	4	7
Angling Challenge	-	-	4	2	-	6
Serenity/Solitude	-	-	3	-	-	3
Total	61	30	25	17	18	151

Angler respondents also placed high importance good catch rates, high fish numbers, the quality of fish available, good water type and the scenery and environments in which they fish.

It is apparent from table 6.9 that the majority of reasons for angling popularity are primary angling motives, for example access and catch rates. Secondary angling motives such as solitude etc are relatively minor in importance. This may be because they are not conciously recognised by anglers, or alternatively the anglers that responded were less concerned with such

factors. Bryan's (1977) recreational specialisation continuum, as it relates to anglers, possibly goes some way to explaining this, by showing that highly specialised recreationalists tend to be more aware of the factors that define their recreational satisfaction. The implications for this study may mean that relatively few highly specialised anglers within the group of respondents would allow the less specialised but numerically superior anglers to skew the results toward more primary reasons for angling satisfaction. It may also be that even specialised anglers refer to primary factors as the major source of angling enjoyment, before they consider secondary satisfying motives. The selection of only the three major reasons for enjoyment for each of the top five rivers may also have biased the findings of this section, by failing to consider other reasons named by respondents. In addition table 6.8 shows the percentage of the total respondents to be only 37.6%. This means that over 60% of respondents nominated rivers or catchments other than the five named as providing their most enjoyable angling experience. This would tend to suggest that accounting for the differing tastes of angling respondents is difficult as individual anglers have wide ranging tastes and preferences. Such results, however, possibly indicate that Nelson anglers have abundant angling opportunities and as a result no one river or catchment is excessively valued above any other. If one river or catchment received universal mention it would suggest that the angling opportunities for anglers were strictly limited.

5) Least Enjoyed Rivers/Catchments of Nelson Anglers

In contrast to the most-enjoyed catchments are the catchments judged by anglers to be the least enjoyable during the 1989/90 season. The five least enjoyed rivers or catchments, in reverse order of preference were, the Motueka, Waimea, None, Buller and Motupiko (Table 6.10).

Table 6.10: The Five Least Enjoyed Rivers/Catchments of Nelson Anglers 1989/90.

River/Catchment	Ranking	No.Respondents	%Tot.Respondents
Motueka	1	31	10.8
Waimea	2	24	8.3
None	3	2	7.3
Buller	4	20	6.9
Motupiko	5	10	3.5
Total		106	36.8

The reported option of "None" was an unexpected response from anglers. This was distinct from a non-response by anglers. Respondents observed, with minor variations, that every fishing experience was enjoyable despite its outcome. Cross tabulations showed that such anglers were generally skilled anglers, suggesting that they were keener and more able to appreciate the overall "angling experience".

Interestingly, the Motueka and Buller rivers /catchments were included within the five most enjoyed catchments, however these opinions were probably expressed by a different group of individuals, with different experiences, values and viewpoints.

When the major reasons for the five named rivers being relegated to their "least-enjoyed" status are examined, it becomes apparent that this status is due primarily to angling related reasons, with other considerations assuming less importance (table 6.11).

Table 6.11: The Major reasons for the Unpopularity of the Five Least Enjoyed Rivers/Catchments

Reason	Motueka	Waimea	None	Buller	Motupiko	Total
Low Fish Numbers	9	13	2	4	8	36
Every Trip Enjoyable	-	-	16	-	-	16
Low Water Flows	5	4	-	-	3	12
Gravel Extraction etc	-	11	-	-	-	11
Bad Weather	5	-	-	4	-	9
Caught No Fish	-	-	-	7	-	7
Excess Fishing Pressure	4	-	-	-	-	4
Other Recreationalists	4	-	-	-	-	4
Fish Too Wary	-	-	1	-	2	3
Total	27	28	19	15	13	102

Low fish numbers were considered the major reasons for a river's least enjoyable rating. Some anglers observed that every fishing experience was enjoyable, however many anglers clearly did not agree. These anglers commenting that low water flows, bad weather, catching no fish, conflict with others, too much fishing pressure and the trout being too wary were major reasons for their angling dissatisfaction. Water and gravel extraction, protection works and pollution within the Waimea catchment were also expressed as a perceived reason.

Many of the problems encountered in interpreting the data on the "most enjoyed" rivers are inherent within this section. It appears that primary influences that directly effect angling success are again the most important determinants of angling satisfaction or dissatisfaction. However the impact of factors possibly affecting the anglers' perception of quality are also significant. This would suggest that anglers' tend to base their classification of most and

least enjoyed areas on different criteria. Possibly many anglers rate their favourite locations on perceptions of quantititative factors, such as catch rate or travel distance, because these may be the primary motivations for angling. In contrast, their least enjoyed locations may be perceived from a qualitative level as they reflect on why they did not enjoy the experience.

In conclusion then, this chapter has shown the spatial angling activity of Nelson anglers surveyed in the local angler postal questionnaire. The Motueka and Buller catchments were shown to be the most fished catchments within the Nelson District, while Marlborough and the West Coast were the most fished areas outside of the survey area by Nelson anglers.

This chapter has also explored the reasons why such patterns of angling activity occur, however it has deliberately not estimated total angling usage within the study area or attempted to assess the impacts such angling patterns may be having on the Nelson trout fishery. Such factors are to be examined in chapter seven.

CHAPTER SEVEN:
IMPACT OF ANGLING IN NELSON

1) Angler Impact Theory

1a) Definitions of Impact

It is likely that the numbers of anglers fishing for trout within the study area will increase in the future. If this is so then demand for angling in rivers and lakes will continue to grow. This potential demand for angling can be related to the work of O'Riordan (1967) who found that demand for outdoor recreation increases at a rate 40 times greater than the increase in population growth. If this is true, then angling resources will undoubtedly increase in recreational importance in Nelson.

However with increased use of the angling resource comes the question of impact. A basic premise of resource management is that any use produces change. This is undoubtedly true of freshwater angling. The degree of change or impact upon the angling resource can take a number of forms and may have different consequences for different angler user groups.

Excessive exploitation of the resource, may result in the collapse or serious decline of such a fishery, with decreasing levels of satisfaction for involved angling groups and individuals. It is the role of the fisheries manager to ensure that opportunities are available for as many groups as possible and that the angling resource is sustainable on an indefinite basis. To do this some attempt to monitor the impacts of anglers must be undertaken, in conjunction with other management responsibilities.

Unfortunately levels of impact are difficult to measure. Many impacts are very subtle and difficult to detect and indeed have different meanings to varying individuals. Impacts can take two forms:quantitative or qualitative impacts.

Quantitative factors in the form of fish stocks or rivers available to anglers are certainly important to anglers, however it is possible that angling quality has the most important influence on anglers. Many qualitative factors, for example few other anglers around, are passive but important components of a quality river fishing experience.

This chapter will examine the above comments and also estimate the total use of the Nelson trout fishery by all involved angler groups. Estimates of angling impact on the fishing resource are made with a number of different variables and the potential of anglers to adversely affect the fishery is also examined. The chapter also explores angler perceptions of the degree of change within the Nelson fishery over time and the forms these perceived changes have assumed.

1b) The Importance of the Recreation Opportunity Spectrum in Assessing Angling Impact

A variety of environmental settings and biological factors are needed to fulfil the the many needs, motivations, and preferences that lead anglers to behave in the way they do. Recreational preference shows that Nelson anglers prefer differing rivers for a number of diverse reasons. Fish numbers, high catch rates, good access and being close to home are important to many anglers, however, it is clear that not all anglers value such factors above other reasons which may be less visible to a researcher.

Angling locations within the study area appears to exibit little substitutability. Substitutability refers to the extent to which angling opportunities can be interchanged in terms of satisfying anglers motives, wishes, and desires. Very different motives and interests attend each angler and as such each water body is accompanied by different perceptions as to its use. Anglers in this study appeared to be knowlegeable and discerning in their choice of angling location, with certain waters being nominated as offering qualities that were

not generally available elsewhere in the District. Nelson anglers indicated that certain satisfactions such as challenge, solitude etc, are specifically linked to particular environments. Such satisfactions are labelled "dependent" (Stankey,1974). If the setting or a particular quality is lost, then the capability to provide such satisfactions is also lost. For example if certain key Nelson waters were allowed to be degraded or lost some specific qualities, such as high fish numbers etc, then their potential as important recreational fisheries could be lost. This may be important because it could redirect angling effort elsewhere, which may place additional pressure on other remaining angling waters.

2) Determination of Total Angling Activity

2a) Total Estimated Use of the Fishery

In an attempt to assess angling effort and location as a factor of impact, a number of calculations had to be made to estimate total use of the fishery.

This was done by extrapolating total use figures, indicated by questionnaire respondents, to include the total number of adult whole season licence holders, assuming that all such anglers showed similar patterns of angling activity and location. However the potential for error was large as anglers sampled comprised only 16.57% of the total adult whole season licence holders.

From here, the total number of days fished by all other classes of licence holders were estimated. Using Toynbee's (1974) findings, that showed adult whole season licence holders did 86% of angling days fished, it was assumed that licence categories other than adult whole season, would comprise only 15% of the total angling days fished within the district. This assumed proportion was raised and lowered respectively in the Eastern and Golden Bay catchments to take account of different circumstances. The Eastern catchment proportion of "other" licence catergories was raised to 30% to

reflect probable increases in angling usage due to a large population base and increased numbers of, particularly, junior anglers fishing in local catchments. In Golden bay, this proportion was dropped to 5% as it was felt other licence classes would rarely travel to fish such areas, because of travel time considerations.

To calculate total use by anglers originating from areas other than the study area, the assumption of Graynoth, et al,(1974) was used. Graynoth, et al, estimated that outside anglers fished about 15% of the total days fished by local licence holders. This proportion was lowered to 5% in the Eastern and Golden Bay catchments because it was considered that such areas would not attract significant numbers of outside anglers when areas such as the Motueka and Buller were present and were promoted within New Zealand angling publications.

Total use by professional fishing guides was also calculated. For the Buller catchment statistics were already known from the trout fishing guide questionnaire 1989/90. For the other catchments, particularly the Motueka, estimates were made by the writer , based on inside knowlege within the fishing industry.

Table 7.1, based on these assumptions, and survey data from this study, shows the total estimated days fished by all angler groups on the four major catchment areas.

The total estimated angling days of 36 778, was less than the estimate of Richardson (1984), who estimated total use of 22 Nelson rivers, from all catchments. Richardson's calculations were 12% greater than those of this study.

Table 7.1: Estimated Total Days Fished Within Nelson For All Catchments.

Catchment	Est.Tot.D.F	%Est.Tot.DF
Motueka	16 554	45.0
Buller	13 734	37.3
Eastern	5 010	13.6
Golden Bay	1 490	4.1
Total	36 778	100.0

Note

Est.Tot.D.F Estimated total number of days fished within the Catchment

%Est.Tot.DF Percentage of estimated total number of days fished within the study area

Tables 7.2-7.5 show the total estimated usage of all fishing areas within Nelson as based on data from the 1990 sample survey. The writer believes that these figures provide a reasonable estimate of the actual situation although it is considered that the mainstream river predictions are probably most accurate because of the often high angling usage they experience, resulting in a larger data base from which to base estimates of total use. The distribution of angling activity on the smaller tributaries may be wrongly distributed by the estimation process, as a smaller number of angler respondents may unduly bias estimates based on a limited data base. It is the opinion of the writer that many less popular waters may be fished less than predicted, for this reason.

Table 7.2: Total Estimated Use of the Motueka Catchment.

	Days Fished By All Angling Groups				
River	AWSLH	Other.LH	Outside.Ang.	Guiding.	Total
Motueka(b.Wang.)	6530	979	1126	101	8736
Wangapeka	1780	267	307	45	2399
Motueka(a.Wang.)	1596	239	275	11	2121
Riwaka*	910	137	157	30	1234
Motupiko	651	98	112	35	896
Baton	470	71	81	6	628
Pearse	132	20	23	7	182
Graham	102	15	18	3	140
Tadmor	84	13	15	5	117
Rainy	66	10	11	4	91
Other Motueka	6	1	1	2	10
Total	12327	1850	2126	251	16554

Key to titles

*	Independent river within named catchment area
AWSLH	Adult whole season licence holder
Other. LH	All Nelson licence holders other than adult whole season
Outside.Angl.	Anglers residing outside the study area
Guiding.	Estimated and actual guiding days
Total	All above groups combined

Note

These titles will be used for the next three tables as well.

Table 7.3: Total Estimated Use of the Buller Catchment.

	Days Fished By All Angling Groups				
River	AWSHLH	Other.LH	Outside.Angl.	Guiding.	Total
Buller(a.Kawatiri)	1 913	287	330	68	2 598
Buller(b.Kawatiri)	1 418	212	244	70	1 944
Lake Rotoroa	1 303	195	224	1	1 723
Lake Rotoiti	971	145	167	-	1 283
Mangles/Tutaki	724	108	124	125	1 081
Gowan	706	105	121	12	944
Maruia	688	103	118	39	948
Sabine	471	71	81	3	626
Owen	440	66	75	54	635
Matakitaki/Glenroy	410	61	70	21	562
Travers	398	59	68	11	536
D'Urville	271	40	46	1	358
All Others	241	36	41	5	323
Matiri	132	19	22	-	173
Total	10 086	1 507	1 731	410	13 734

Table 7.4: Total Estimated Use of the Eastern Catchments.

	Days Fished By All Angling Groups				
River	AWSLH	Other.LH	Outside.Angl.	Guiding.	Total
Waimea	1 319	395	85	5	1 804
Wairoa	410	123	27	5	565
Wai-iti	355	107	23	2	487
Lee	223	70	15	-	308
Roding	60	18	4	-	82
Wakapuaka*	506	152	33	10	700
Maitai*	488	146	32	8	674
Whangamoa*	283	85	19	2	389
Total	3 644	1 096	238	32	5 010

Table 7.5: Total Estimated Use of the Golden Bay Catchments.

	Days Fished By All Angling Groups				
River	AWSLH	Other.LH	Outside.Angl.	Guiding.	Total
Aorere*	433	65	25	-	523
Takaka	289	43	17	-	349
Cobb	223	33	13	-	269
Cobb Reservoir	157	24	9	-	190
Anatoki	42	6	2	-	50
Other*	90	14	5	-	109
Total	1 234	185	71	-	1 490

From these tables it is possible to calculate the relative frequency of catchment use by the four different user groups (table 7.6).

Table 7.5a: Intensity of Catchment use by Different Angler User Groups.

User Group	Motueka	Buller	Eastern	Gd.By	Total
Adult Whole season Licence Holder.	75.0	73.4	72.7	82.8	74.2
All other Nelson licence types	11.2	11.0	21.9	12.4	12.6
Outside Nelson recreational anglers	12.8	12.6	4.8	4.8	11.3
Professional fishingguides/clients	1.0	3.0	0.6	-	1.9
Total: All Users	100.0	100.0	100.0	100.0	100.0

It can be seen that most of the estimated use of Nelson angling waters was by adult whole season licence holders. Other Nelson licence types and outside anglers were of medium importance, while fishing guides contributed only a small proportion of days fished within all catchments.

2b) Estimated Angling Activity Per Unit Length of River

Having established the total estimated days fished within the study area, other indices of angling impact can now be considered.

In order to work out the impact per unit length of river, the length of fishable water in each river was measured in kilometres. To calculate this figure for lakes, the wetted perimeter was used. Table 7.6 shows the measured total kilometres of fishable water in each catchment, excluding headwater reaches that contain few, if any trout. It also shows the estimated total days fished during the season. These variables were combined to show the average number of days fished per kilometer within each catchment.

Table 7.6: Relative Angling Intensity Per Catchment

Catchment	Tot.Est.Length.	Total Est.DF	D.F/Km.
Motueka	232.5	16 554	71.2
Buller	339.5	13 734	40.5
Eastern	112.5	5 010	44.5
Golden Bay	193.0	1 490	7.7
Total	877.5	36 788	41.9

Key to titles

Tot.Est.Length	Total estimated length of fishable water (Km)
Tot.Est.DF	Total Estimated Days Fished in each catchment
DF/Km	Average Days Fished per Kilometer

This Table shows that the Motueka is the heaviest fished catchment per length of rivers, followed by the Eastern and Buller catchments respectively. The Golden Bay has very minor levels of angling intensity per length of water available. To define fishing intensity in more detail, days fished per kilometer were calculated for each river/lake that individually generated over 1% of the total estimated fishing days. Angling use within Nelson was found to range between intensive and extensive use (Table 7.7) (Fig.27a).

Figure 27a: Fishing Intensity Per Kilometer On Individual Angling

Waters

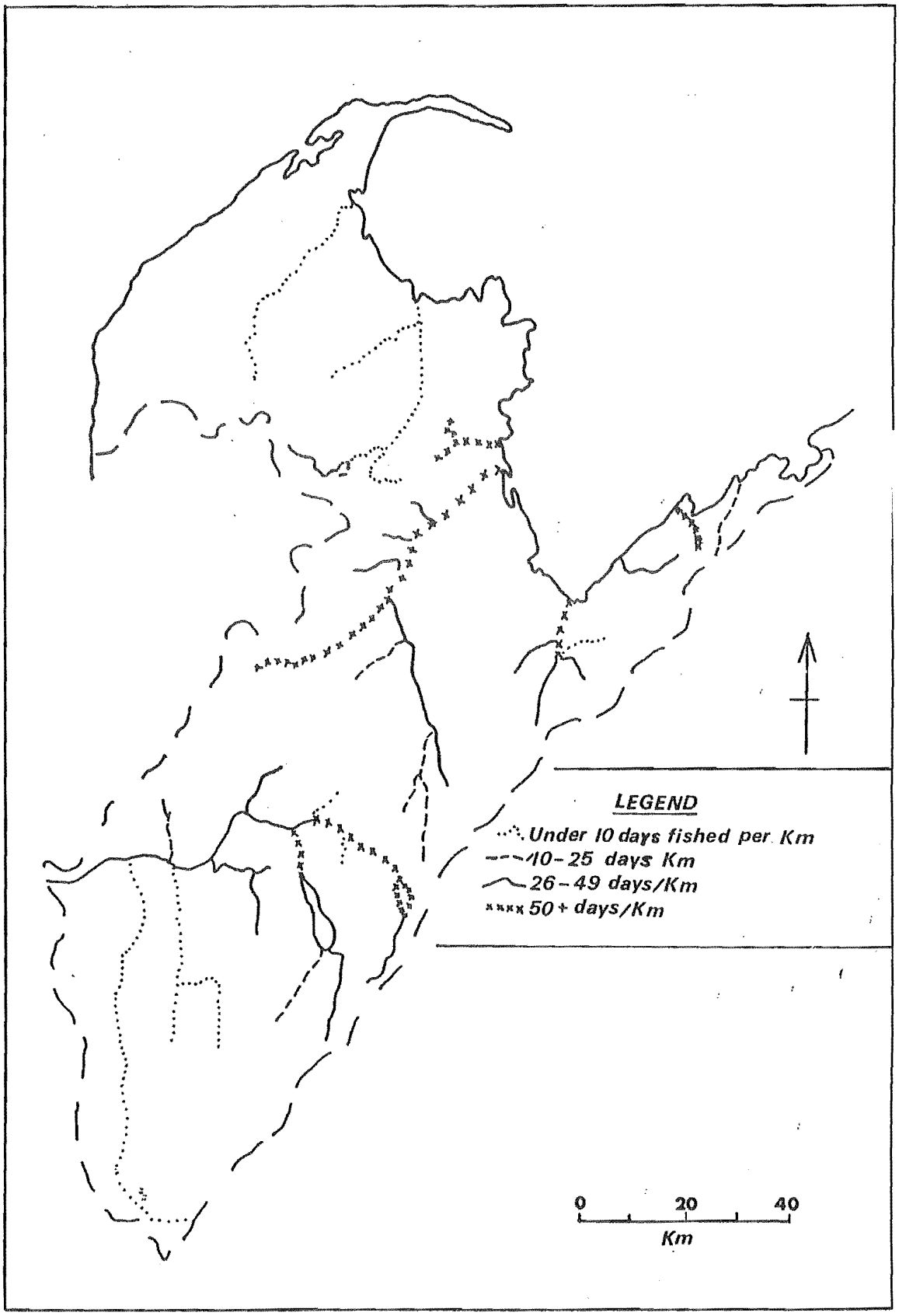


Table 7.7: Relative angling intensity Per Angling Water

River/Lake	Rank	Length.F.W	D.F/Km.
Motueka(below Wangapeka	1	44.0	198.5
Waimea	2	15.5	116.4
Buller(above Kawatiri)	3	26.0	99.9
Gowan	4	11.5	82.1
Riwaka	5	16.0	77.1
Wangapeka	6	41.0	55.7
Lake Rotoiti	7	23.0	55.5
Wakapuaka	8	14.0	50.0
Lake Rotoroa	9	34.5	49.9
Maitai	10	14.0	48.1
Owen	11	14.0	45.4
Motueka(above Wang.)	12	49.0	43.3
Graham	13	3.5	40.0
Mangles/Tutaki	14	29.0	37.4
Buller(below Kawatiri)	15	52.0	37.3
Travers	16	15.0	35.7
Sabine	17	18.0	34.8
Baton	18	18.0	34.7
Wairoa	19	18.0	31.4
Pearse	20	6.0	30.0
Wai-iti	21	16.0	30.4
Cobb	22	9.0	29.9
Lee	23	11.5	26.8
Whangamoa	24	16.0	24.3
D'Urville	25	16.0	23.4
Motupiko	26	40.0	22.5
Tadmor	27	8.0	14.6
Cobb Reservoir	28	14.0	13.6
Rainy	29	7.0	13.0
Matiri	30	14.0	12.4
Maruia	31	97.0	9.8
Aorere	32	69.0	7.6
Takaka	33	46.0	7.5

Roding	34	11.5	7.1
Matakitaki/Glenroy	35	80.5	7.0
Anatoki	36	25.0	2.5

Key to Titles

Length.F.W Length of fishable water (Km)

DF/Km Average number of days fished per kilometer of water

2c) Relationship Between Water Volume and Trout Stocks

Factors other than days fished per kilometer can also be used to gain an indication of angling pressure. Factors such as water volume and trout stocks available to anglers would also be assumed to be of importance. Water volume within a river or lake possibly means that different sized water bodies sustain different levels of angling impact. It would be assumed that larger waters would fare better under heavy angling exploitation due to larger amounts of water lessening the effects of angling and also increased fish stocks. To test whether water volume is any indication of fish stocks, drift dive surveys of some Nelson rivers, which recorded trout stocks per kilometer, were compared against the respective water volumes of the same rivers (fig.28). Information on trout stocks came from the National drift dive data base, provided by the Nelson/Marlborough Fish and Game Council. Unfortunately there is no trout stock information for many rivers within the study area, consequently some important angling waters are excluded from such analysis.

If it were assumed that such a relationship was linear, then it would be expected that the larger rivers would hold the most fish. However figure 28 shows that this is not necessarily true. Environmental and biological factors probably playing a major role in this regard. Problems emerge with any

analysis of factors such as trout stocks per kilometer because trout populations migrate throughout river systems and cannot be expected to remain in constant numbers in any one location. Coupled with environmental and biological conditions trout numbers could be expected to be highly variable over any defined period of time. Problems also arise with defining water volume within any one river as only a certain number of recording guages are operational within the study area. This means limited data is available and usually only for a selected point within a river. Recording guages in some catchments are situated in headwater areas while others are sited in the lower reaches, this means all river volumes used in this study are possibly not relative, due to some variability in recording position within each individual catchment. However if it is assumed that all trout stock and river volume factors are constant then figure 28 possibly provides a good insight into the relative densities of trout per volume of water within the study area.

2d) Relationship Between Trout stocks and Total Estimated Angler Use

Figure 29 shows the relationship between trout stocks per kilometer and the estimated numbers of days fished by all angler groups.

Assuming Nelson anglers have equal opportunities to knowlege of fish stocks, it can be seen that there are large variations in the use of Nelson rivers. If it is assumed that a linear relationship exits between variables, then the Riwaka, Maruia, Wairoa, Pearse, Takaka, and Baton rivers are fished consistent with available fish stocks. Other rivers such as the Mangles, Motupiko, Wangapeka and the lower Motueka rivers are fished on more days relative to trout stocks than a linear assumption would suggest. The upper Buller appeared to have low fish stocks yet still attracted large amounts of angling attention. This can be explained by the popularity of the Buller for Nelson anglers, as examined in chapter six. The Gowan river sustained little fishing activity in relation to trout stocks available. This is probably because of white-

Figure 28: Relationship between Water Volume And Trout Stocks

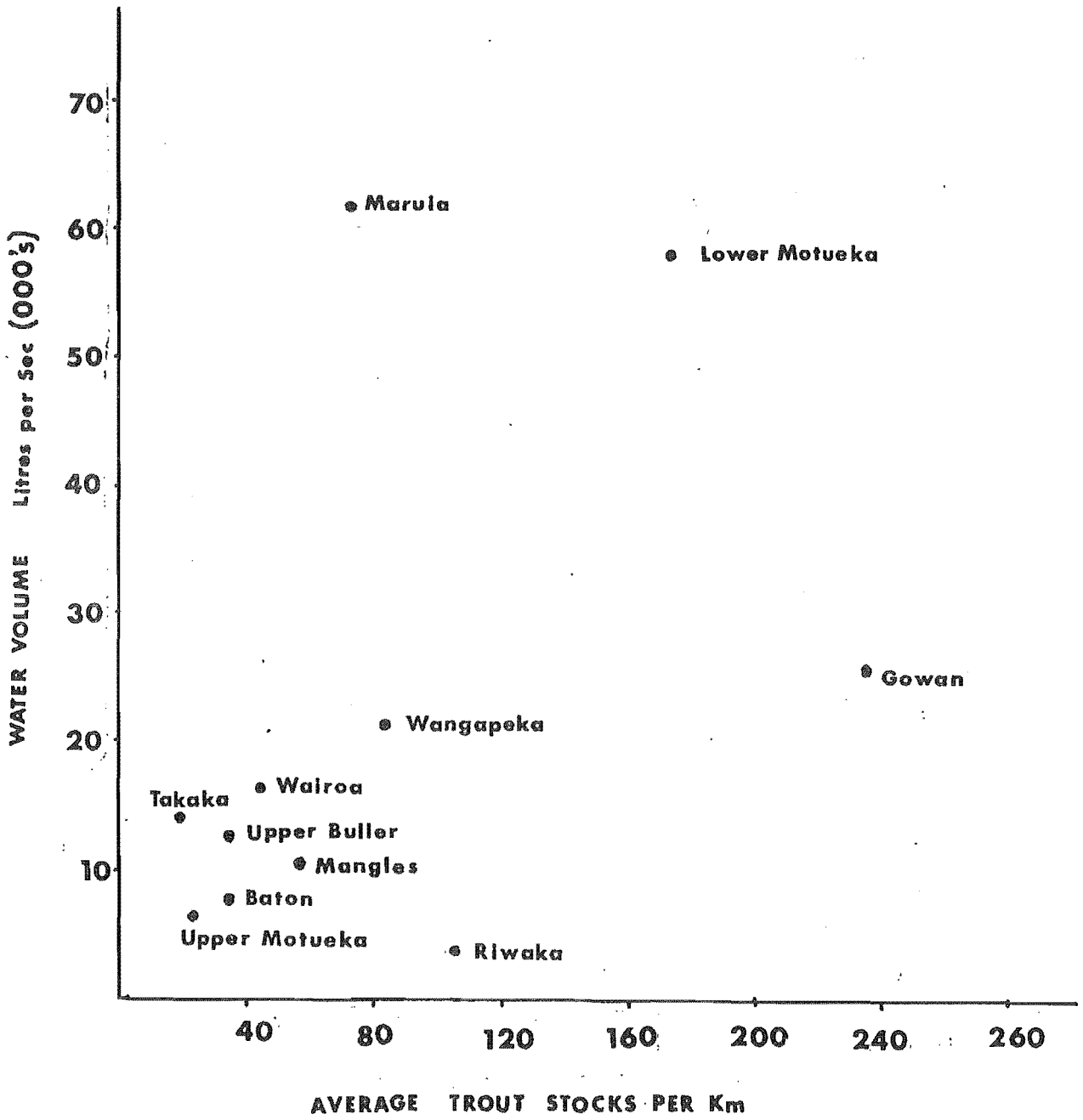


Figure 29: Relationship Between Trout Stocks Per Kilometer And Estimated Total Number Of Days Fished

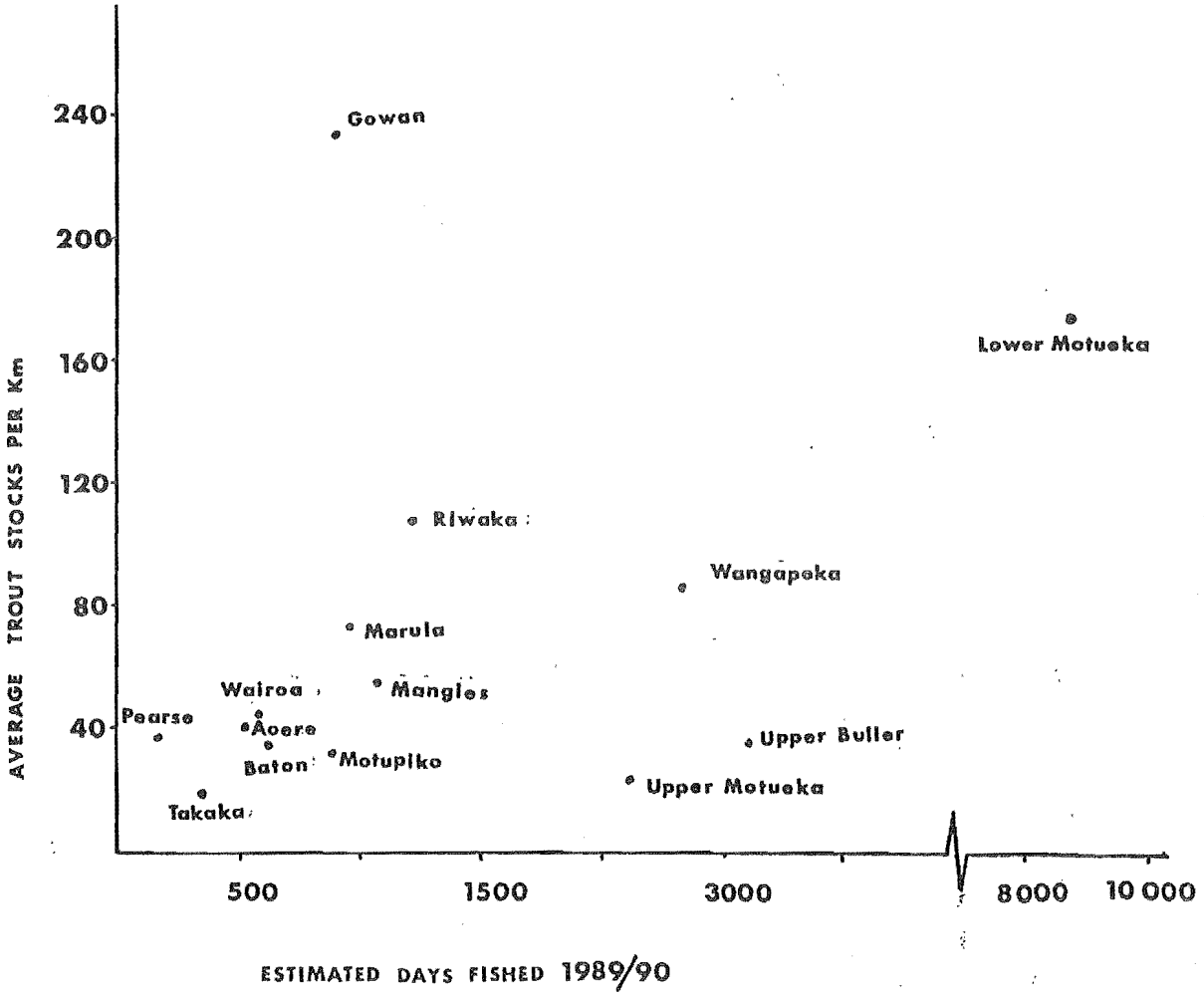
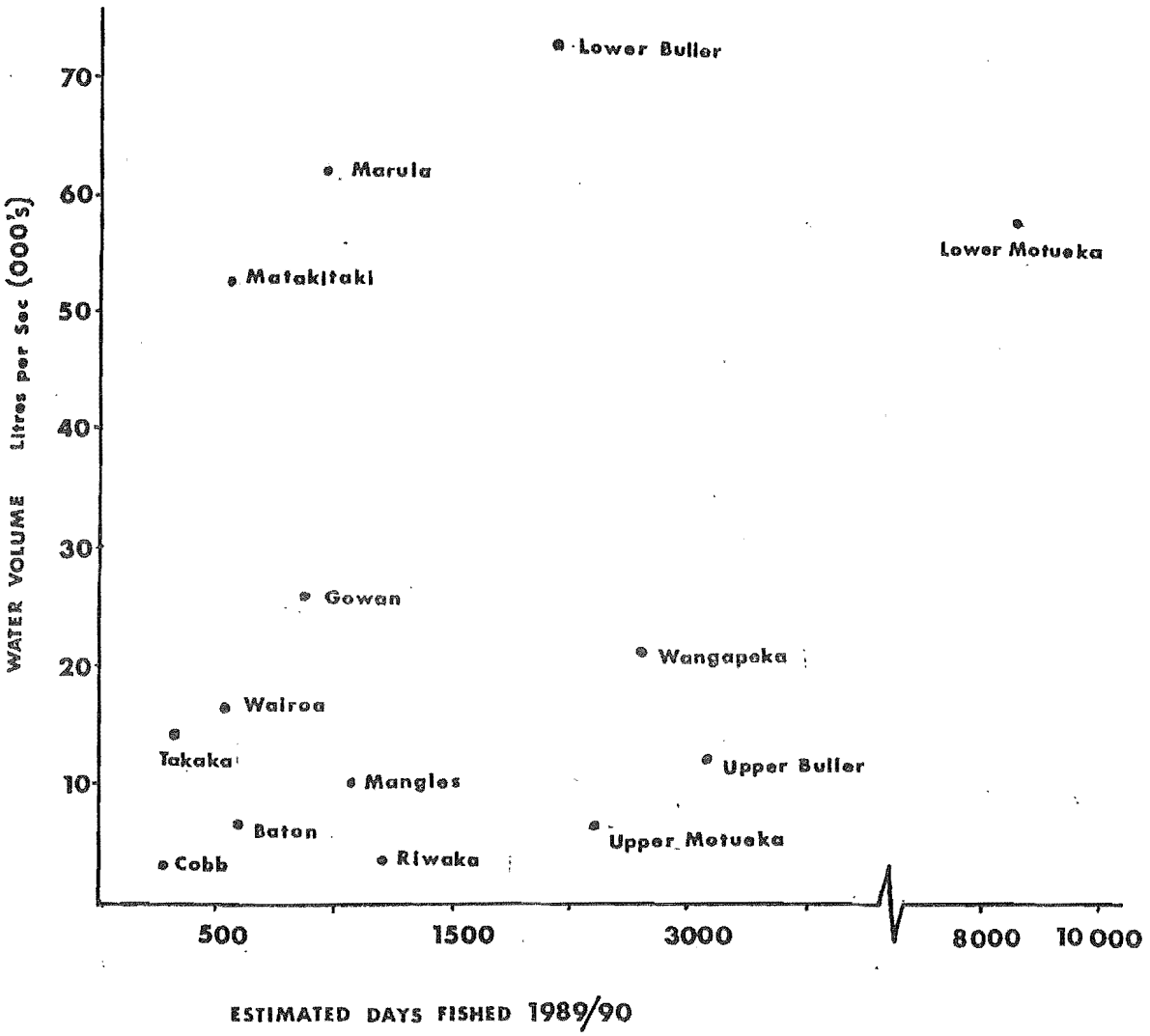


Figure 30: Relationship Between Water Volume And Total Estimated Angler Use



water nature and difficult access along the banks of this large volume, but short length river.

2e) Relationship Between Water Volume and Total Estimated Angler Use

If it is assumed that a linear relationship exists between water volume and days fished then the Gowan, Wairoa, Takaka, Baton, and Cobb rivers largely follow this. However the Mangles, upper Buller, Riwaka, upper Motueka, Wangapeka and Lower Motueka are fished more than predicted by such an assumption (fig.30). This may be due to factors such as accessibility, catch rates, or scenic values. Rivers such as the Lower Buller, Maruia and Matakitaki, all in the Buller catchment, were under fished by this assumption. The reasons for this may be increased travel time as these three rivers are relatively remote from the major angling populations living in the Motueka and Eastern catchments. Another reason may be the size of such rivers which may less pleasant to fish than other smaller streams available to Nelson anglers. The major problem of siltation and discolouration of the Matakitaki river because of mining activities is probably a significant reason as to why this river was relatively little fished.

These rivers, then, can be seen to sustain different levels of angling intensity, with different relationships emerging as the method of analysis is varied. However it is questionable to solely base analyses of angling pressure on total usage of a particular water, using only the variables of fish stocks, water length and water volume.

This next section will examine the possible impact of Nelson angler characteristics on Nelson rivers.

3) Possible Scenarios of Angling Impact Within the Study Area

3a) Method/Skill Level

It was found that the majority of anglers within the District were upstream fly

fishers. This style of fishing may have been bought about by the angling conditions within the District. Clear, stony rivers, stocked with wary brown trout, may have determined the fishing approach necessary for anglers to be consistently successful. Fly fishing anglers clearly have greater levels of success than the next major method, spin angling. It is also apparent that fly anglers tend to be more specialised and as a result are probably keener anglers and thus fish on more days per season than other anglers. It is possible that as fishing pressure increases, trout stocks will become harder to catch, therefore anglers will need to become more specialised to remain consistently successful. This may mean that specialised fly anglers will continue to be successful whilst less specialised anglers, of any method, will incurr decreased success rates. However, it is evident from the high numbers of local anglers who had limited angling success during the 1989/90 season, that the majority of the district's anglers are not consistently successful whatever angling method they use. Whatever the methods of angling or the skill levels of anglers ,the fish stocks will probably remain essentially the same, as they adapt to any changes in angler behaviour or activity, assuming the environmental and habitat aspects of the fishery remain stable.

3b) Place of Residence/Travel time.

Results show that place of residence is a significant variable in which areas are fished. However many rivers within Nelson are relatively remote from main population centers, yet still receive high relative angling usage. These rivers will probably continue to sustain high levels of angling use, while rivers relatively underfished at present, would be expected to be used more and more as the closer, more accessible rivers start to approach their sociological carrying capacities. Sociological carrying capacity, in this case, refers to the amount of anglers and angling activity on a particular water, that individual anglers can tolerate before such factors create an actual or perceived loss of angling satisfaction.

Travel time is undoubtedly thought of as a limiting factor by anglers. However possible improvements in accessibility and consequent decreases in travel time, may have expanded the range of rivers Nelson anglers are prepared to fish. This can be illustrated by questionnaire respondents willingness to travel and also by the distance anglers were prepared to travel to fish outside the District. There may also a trend towards higher angler densities occuring on Wilderness rivers, as anglers with more time for recreation, expend more effort to escape higher numbers of other anglers on the local waters. Unfortunately very little comparive data exists to assess the accuracy of these possible scenarios. It is certain, however, that any rivers within daytrip range are more intensively fished than waters requiring an overnight/weekend or multiple day trips. As a consequence, fish in such waters will be more educated and harder to catch. This however is not necessarily negative, as many anglers will adapt to the challenge originating from changed circumstances.

3c) Seasonal/Daily Angling Intensity.

At present most fishing within Nelson occurs early in the season, in particular during the weekends. As angling intensity increases, it would be expected that more fishing would occur during the week by anglers to avoid competition for prime angling locations during the weekend. Fishing pressure is also likely to become uniform over the length of the season with an increased number of participants. Angling activity at present within Nelson is unlikely to lead to serious competitive relationships between anglers.

3d) Mobility

The majority of Nelson anglers are highly mobile, and many are prepared to fish large distances of water during the course of the day, commonly 3-5Km on some rivers. If angling intensity increases it would be more likely for such anglers to find other anglers in front of them, leading to decreased satisfaction

and possibly conflict. Such occurences happen already, but their frequency is unknown.

3e) Trout Catchability

Trout within Nelson will probably become increasingly accustomed to angling pressure. There is no doubt that trout have become more wary, especially over the last decade or so, in locations that are regularly fished. This is because they were once experienced fishing activity only infrequently, and often had long periods of time before another angler fished that piece of water. Such areas are becoming increasingly more scarce, as anglers become more mobile, more skilful and more knowlegeable, through improvements in technology and increased promotion of the sport. This means that trout have become more accustomed to seeing anglers.This factor coupled with clear water, and the inherent instinctive wariness of the fish, has led to the fish becoming more "educated". As a result trout will probably become much harder for casual anglers to catch. To many anglers this effect is a decline in angling quality, however it is something that Nelson anglers will have to become increasingly used to in the future. In real terms, this possibly means that anglers will have no real biological impact on the fishery, as the trout adapt to changed circumstances.

3f) Trout Habits

Another factor important in assessing the possible impacts of anglers on Nelson rivers, is the probable change in trout locational behaviour. By this it is meant that that they may move into areas where they are not being constantly disturbed. Trout moving into the edgewater regions of rivers to feed will possibly become less common over time. Such fish may prefer to remain feeding in currents with increased velocity and in deeper water, where they are less suseptible to angling pressure. They may also move toward less fished sides of rivers, where they are less likely to be disturbed.

Trout within the District may also change their feeding habits if angling pressure was to increase. They may become more selective in their feeding, requiring better presentations and imitations of food items by anglers. The trout may also change their feeding habits and times. For example by feeding in non-stationery positions allowing them to detect anglers more easily. Trout may also feed at different times of day as a result of angling pressure. Some may rely more on nocturnal feeding or feed heaviest at times when they are less likely to encounter angler interference.

In the opinion of this writer, in conjunction with many other experienced Nelson anglers, the above changes in trout behaviour have been occurring within Nelson for a number of years, albeit at different rates and varying intensities. This process has been gradual but has been one consequence of angling use on Nelson rivers. However other factors such as low water flows and high water temperatures etc, also play a role in such perceptions. It may be possible that trout are more easily caught in some seasons than others for the above reasons.

4) Perceived changes within the Fishery

The trout anglers of Nelson embody a great diversity of demand, and this diversity is the result of individuals desiring varied angling, and separate groups desiring special types of angling. Therefore it would be a serious over-simplification to view any potential angling impacts as homogenous occurrences happening to all anglers within the fishery.

User perceptions of area quality are expressed by user opinions and satisfactions. These perceptions are useful tools in detecting any potential qualitative impacts when considered within the capacity of the recreational resource.

4a) Perceived Degree of Change within the Nelson Fishery

In order to collect information on perceived impacts within the study area, questionnaire respondents were asked to contribute their opinion (fig.31). When asked to what extent, the quality and quantity of angling within the Nelson District had changed over time, 273 respondents gave their opinion. Over half of the anglers felt there had been a change of either minor or major magnitude, while 38 anglers considered that there had been no change whatsoever. About 30% of anglers felt they were unable to comment on the situation, this was possibly because they were too inexperienced to have an opinion.

4b) Perceived Nature of Changes Within the Nelson Fishery

Respondents were then asked to record the nature of these changes and their causes. Most angler comments were of a negative nature.

It was difficult to differentiate between ideas of change and cause as many angler observations could be construed as both. For example the advent of professional fishing guiding in the District was seen as both a negative change and cause by some respondents. Therefore both changes and causes were grouped together for analysis. Positive and negative observations were separated and within these categories the directly fishing orientated replies were differentiated from the habitat/environmental observations. Comments about trout habitat and the general environment included factors that both enhanced and degraded the angling experience for many respondents.

The negative change/cause catergory illicited the majority of replies (85.2%), while the perceived positive factors received only 14.8% of responses. This was not an unexpected response as a survey of this nature probably encourages more negative comments than positive ones.

Figure 31:

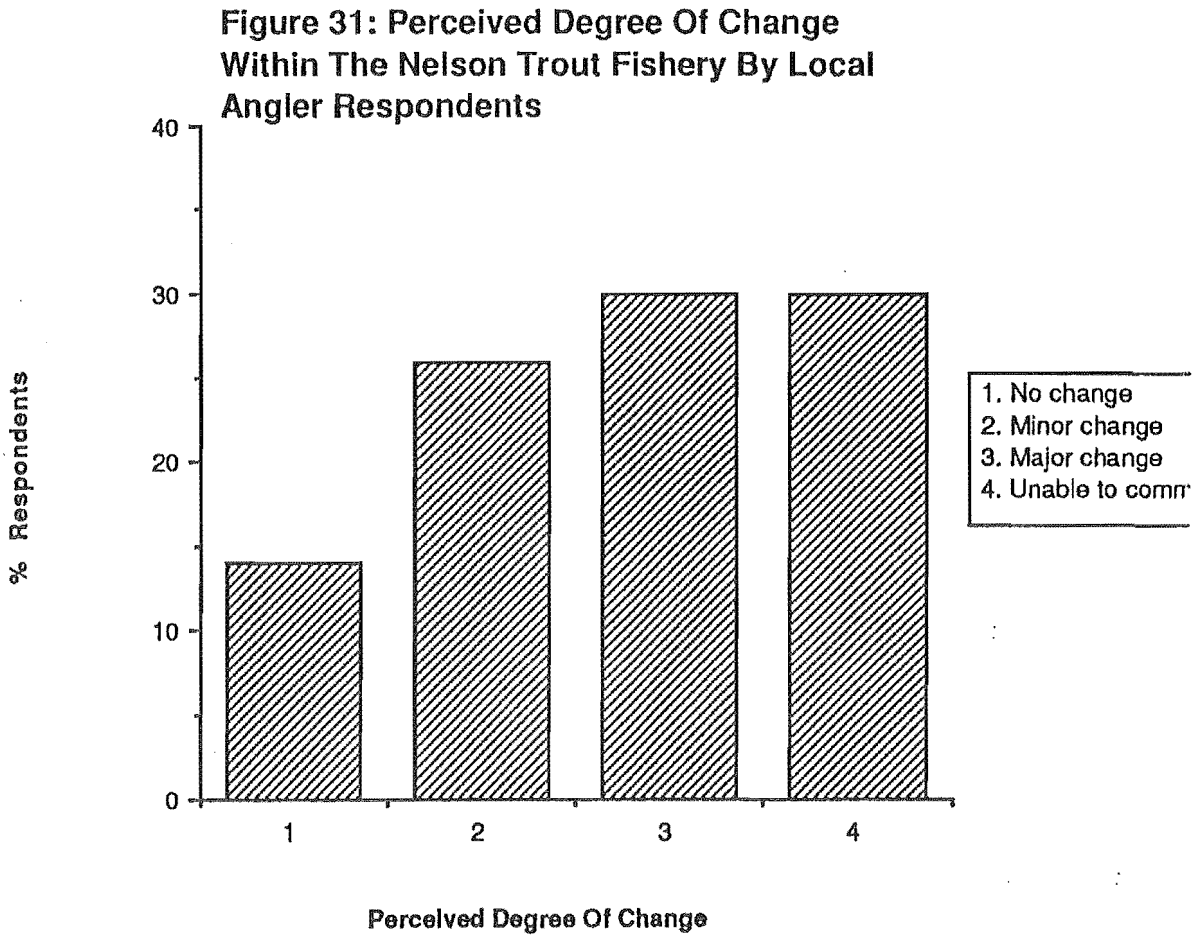


Figure 31: Perceived Degree Of Change Within The Nelson Trout Fishery By Local Angler Respondents
40
30
20
10
0
% Respondents
1
2
3
4
Perceived Degree Of Change
1. No change
2. Minor change
3. Major change
4. Unable to comm

4c) Perceived Development of Positive Aspects Within the Nelson Trout Fishery.

Anglers indicated that reduced bag limits, former Acclimatisation Society management policies , catch and release, and general conservation awareness were the major positive developments within the Nelson angling District (table 7.8). The development of positive angling aspects accounted for 92.5% of replies whilst only 7.5% of positive comments concerned trout habitat or the environment.

Table 7.8: Positive Concerns/Observations

Fishing orientated aspects	Rank	No.Resp.	%Resp.
Reduced bag limits	1	27	31.0
Acclim. Soc. action and management	2	26	29.8
Trend toward catch and release	3	10	11.5
General conservation awareness	4	9	10.3
Fish stock improvements in some areas	5	5	5.8
Better access	6	4	4.7
Winter fishing extentions	7	2	2.3
Advances in angling technology	7	2	2.3
More people fishing	7	2	2.3
Total		87	100.0
Environmental/habitat orientated replies			
Improvements: erosion control/river works	1	5	71.4
Recovery from flooding	2	2	28.6
Total		7	100.0

4d) Perceived Negative Aspects Within the Fishery

Perceived negative aspects by anglers generated far more responses. The

Table 7.9: Negative Concerns/Observations

Fishing orientated aspects	Rank	No.Resp	%Resp
Low fish numbers/declining stocks	1	98	25.2
Lack of restocking	2	87	22.4
Levels of fishing pressure	3	75	19.3
Professional fishing guides	4	41	10.5
Fish size decreasing	5	15	3.8
Problems with other recreationalists	6	13	3.3
Too many fished killed	7	12	3.1
Fish more wary/harder to catch	8	11	2.8
Problems with access/landowners	9	10	2.6
Poor society management	10	9	2.4
Winter fishing/size limit	11	7	1.8
Access too good to most locations	12	5	1.4
Litter problems	13	3	0.7
Poaching	13	3	0.7
Total		38	100.0
Habitat/environment orientated			
Flooding	1	34	22.2
Deforestation/exotic forestry	2	33	21.6
Gravel extraction/mining/siltation	3	21	13.6
Low water conditions	4	14	9.1
Erosion and pollution	5	13	8.5
Reduction of trout habitat	5	13	8.5
River protection works	6	12	7.8
Weather patterns changing	7	5	3.4
Less trout food available	8	4	2.6
Water abstraction for irrigation	9	2	1.3
Lower water quality	9	2	1.3
Total		153	100.0

four major negative comments were decreased/low fish numbers, lack of trout restocking, high levels of fishing pressure and the activities of professional fishing guides (table 7.9). Comments on solely fishing oriented factors comprised 71.4%, while environmental concerns accounted for 28.3%.

5) Points of Interest Arising From Angling Impact Assessment

5a) Impact of Professional Fishing Guides and Clients on the Nelson Trout Fishery.

This study has established that levels of guiding usage are relatively minor, especially in regard to levels of usage by recreational anglers. Guided fishing trips were estimated to be under 3% of the total days fished on Nelson waters during the 1989/90 angling season. Such levels of usage are probably insufficient to be having any noticeable effect on the Nelson trout fishery. Considering the high rate of catch and release (97.8%), the impact on the fishery should be negligible relative to the effects of environmental and habitat influences.

It is unknown whether fishing guides are having any effect on trout fishing in Nelson. They are a skilful group of individuals, only having been around for a decade, who are competing for a natural resource with local recreational anglers. However the extent of any angling impact is uncertain, even dubious.

At present there appears to be no evidence to point toward excessive use of any rivers within the study area. Guides appear to be regulating their own angling behaviour, spreading their guiding activities over a wide range of waters, both within and beyond the study area.

5b) The Angler Carrying Capacity of the Study Area.

A number of local angler respondents expressed concern about the number of anglers, the amount of fishing pressure, and the advent of professional fishing guiding within the study area. Such comments may indicate a

perceived conflict situation in regard to angling carrying capacities. It is this writers opinion that any perceived increase in the number of anglers and angling effort on any waters, will initially be accompanied by resentment and competition, but eventually tolerances will change in regard to the sociological requirements of angling, especially carrying capacity, and then most users will accept the rights of other user groups.

Carrying capacity in relationship to angling has a number of dimensions. The biological carrying capacity refers to the numbers of fish removed from any fishery by anglers. If the biological capacity of the fishery is insufficient to replace the fish that are being removed by anglers, then the fishery will collapse. This is highly unlikely to occur in Nelson given the extent and nature of angling waters, especially in regard to this study's finding that about 60% of trout landed during the 1989/90 season were released alive.

The physical angling carrying capacity refers to the amount of anglers that can be physically put onto a stretch of river. When it is considered that the study area probably has in excess of 1000 kilometers of angling water available to anglers, then it can be seen that no problem of this nature will probably ever occur.

The sociological carrying capacity refers to the level of angling that can be sustained on Nelson rivers without seriously affecting the angling satisfaction of anglers. This form of carrying capacity is harder to define as it is an individual consideration. Many different anglers will have different views on what constitutes the sociological carrying capacity of Nelson angling waters, as they will have different preferences and tolerances. However judging from the relatively minor number of replies associated with this concept it is likely that the Nelson Fishery could sustain greater levels of angling activity before this situation becomes a problem to anglers. So many waters are relatively unfished and so many opportunites exist for Nelson anglers that the sociological carrying capacity is probably far from being exceeded.

Angling carrying capacity therefore, is not a simple, single, absolute value within the Nelson study area. From the findings of this study it appears relatively unimportant at present within the study area. The most important factor within such fisheries is that possible increased angling effort is not excessively changing the environmental, ecological and biological aspects, that many anglers value so highly. Carrying capacity is only one factor in any assessment of impact, at any one time a combination of factors is probably having a cumulative influence on the Nelson trout fishery. To highlight any one factor is premature and ill-informed. Poor environmental and ecological conditions including flooding, siltation of rivers, low water flows and increased water temperatures, coupled with increased local and guided angling may be some of the factors altering the short term dynamics of such a fishery. However in the long term, the prospects look good - clear, unpolluted rivers with relatively low levels of angling exploitation,compared to the international experience, bode well for the future

5c) Implications For Future Research on Angling Impact Within the Study Area

Any inferences about the angling impacts on the Nelson trout fishery at this stage can only be based on educated opinion. So little data exists on any aspect of this chapter that no definite evidence can be provided to substantiate many suspected occurences within the fishery. This chapter has not attempted to be, and should not be regarded as, an in depth examination of angling impact in Nelson. However this section has indicated some of the suspected impacts of the study findings, and has identified some areas of research that require more study, if more knowlege on angling impact is required.

Because of the regional basis of this study, this chapter could only be an overview, recording the general observations of anglers, as well as discussing possible scenarios' emerging from the study. Future studies assessing

angling impact within the District should be undertaken on a smaller scale, possibly catchment scale and ask more specific information of anglers. In this way often vague generalities and comments might be avoided, with information collected being of more direct applicability in assessing angling pressure.

CHAPTER EIGHT: IMPLICATIONS FOR FISHERIES MANAGEMENT.

This study contains a diverse range of information about the Nelson study area that is relevant to fisheries management. This chapter discusses many of the salient points emerging from this research, in regard to management issues within the Nelson angling District.

1) Modern Fisheries Management

It is the role of the fisheries manager to ensure that angling opportunities are available for all anglers and that the angling resource is sustainable on an indefinite basis.

The newly formed Nelson/Marlborough Fish and Game Council acknowlege that managing trout fisheries requires more than the setting and enforcement of angling regulations. Taking care of habitat is of major importance, along with advocacy for the recreational angler.

Destruction of habitat is possibly the largest concern within the Nelson District. The Nelson/Marlborough Fish and Game Council has attempted to limit the impacts of mining, water use, forestry and river control. In most cases these attempts have met with considerable success.

Perhaps the major achievement has been the granting of a water conservation order for the Buller river catchment in 1989. Under the Water and Soil Conservation Act (1967), and its accompanying Wild and Scenic River Amendment (1981), rivers with outstanding features and characteristics can be protected by the declaration of a water conservation order. Such outstanding features can include fisheries and scenic attributes, as is the

case of the Buller. Rivers eligible for the status of a conservation order must be of National, or at least regional importance. The 1981 amendment was put in place as many important recreational rivers were at risk with the particular threat of hydro-electrical development. A water conservation order provides statutory protection for the recreational and instream values present within the protected river. At present conservation orders for the Motueka and Riwaka catchments, within the study area, are being sought by the Fish and Game Council.

The major thrust of modern fisheries management on a worldwide basis revolves around wild trout management. Management strategy attempts to ensure that, habitat is protected, wild trout productivity is maximised, that trout stocking of rivers is unnecessary, and that the impact of development and angling is minimised.

2) New Management Approach Within the Study Area For the 1990/91 Angling Season By the Nelson/Marlborough Fish and Game Council

The Nelson/Marlborough Fish and Game Council, under its modern fisheries management techniques, is moving away from the strict regulation of anglers. Effective from the beginning of the 1990/91 season, bag limits of two fish per day have been set in sensitive, high use and headwater areas, as identified by the Council. The Council has also opened up new angling opportunities for many anglers, by removing fly fishing only rules on rivers that formerly had such restrictions. This means that anglers who use spinning tackle are not so restricted. This has been done to open up opportunities to all anglers who pay for the right to fish, make regulations simpler, and to remove ill conceived and outdated restrictions. The liberalisation of angling regulations is a positive step toward increasing angler satisfaction and making effective policing of the fishery possible. The lowering of bag limits may have a positive effect on some fisheries that are sensitive to angling pressure, however, it may also have a psychological influence on anglers, encouraging a conservation

awareness and help promote the feeling that the fishery is under proper management.

The council has also initiated a programme to liberalise angling within the study area, and has taken a "soft option" approach in managing angler activity and behaviour. The Council is attempting an education campaign; in catch and release; fish tagging programmes; and by encouraging anglers to ask property owners when crossing private property.

These steps herald an exciting new era within the Nelson District. Such moves go a long way to addressing angler concerns as expressed within the Nelson regional angler questionnaire.

3) Angler Comments/Suggestions/Criticisms of Fishery Management

In the concluding section of the questionnaire, anglers were asked if they had any comments, suggestions or criticisms they would like to make on any aspect of trout fishing or its management within the Nelson angling District. Many of the replies to this question were similar or identical to those contained in the positive/negative observations. Such replies were added to the positive/negative observations and were not analysed within this section on management. The decision to transfer data was made and carefully undertaken, as it was crucial to the interpretation of the results. Individual respondents who repeated themselves were not allowed to gain a "double vote".

Table 8.1 shows the replies broken into three catergories: criticisms, suggestions and comments.

Table 8.1: Criticisms/Suggestions/Comments of Anglers From the Nelson Regional Angler Survey

Type of Comment	No.Responses	%Tot.Responses
Criticisms		
Licence fees too high	22	7.6
Not enough ranging duties done	4	1.4
Suggestions		
Need more angler access areas	11	3.8
Close areas to fishing guides	9	3.1
Need to keep Queens chain	8	2.8
Need more promotion/notify members	7	2.4
Need more spin/bait areas	4	1.4
Ban helicopter angling	3	1.1
Survey to be published	2	0.7
Support increased licence fees	2	0.7
Restrict anglers more than at present	2	0.7
Need for family fishing licence	1	0.4
Stock Maitai Dam	1	0.4
Need co-operation with local authorities	1	0.4
Comments		
Opposed to trout farming	7	2.4
Good comments on present field officer	6	2.1
Praise of Nelson District for angling	3	1.1
Government not assisting angling	3	1.1
Opposition to introduction of Coarse fish	2	0.7
Opposition to new Fish and Game Councils	1	0.4
Total	100	34.7

From the criticisms, suggestions, and comments section emerge quite a number of different observations. Many of them are solely the perceptions of individual anglers, however the opinions of such anglers are valuable guides to the Fish and Game Council in assessing the effectiveness of management policies and the relationships between the manager and the user.

4) Angler Awareness of Angling Issues

It is clear from angler comments in chapter seven ,that most anglers were concerned about perceived low numbers of trout available and the high levels of fishing pressure as affecting the quality of angling within Nelson. They were also concerned with the environment and trout habitat. They viewed positively, reduced bag limits, management of the fishery, catch and release, and an increase in general conservation awareness.

From this writers interpretation of comments etc.,it was thought that many anglers had limited knowlege of the Fish and Game Council initiatives and what actions were being taken to protect and enhance the fishery. This writer feels that continuing efforts should be made on the behalf of the Fish and Game Council to keep anglers informed about developments within the fishery. The Senior Field Management Officer for the Council, Mr Mace Ward (9/10/90), commented to this writer that the formation of the Fish and Game structure has allowed the development of a more open organisation than the former Nelson Acclimatisation Society. The Fish and Game Council also realises that it is in an important "partnership" with anglers and requires angler input to manage the fishery to the satisfaction of most users.

Three key issues, however, remain relatively unexplored and this writer would like to comment on them. These topics are angler education, angler ethics, and the question of access to the fishery resource.

5) Education

The Council could attempt to increase its profile, reporting regularly to members, many of whom appeared ignorant and uninformed on even basic issues. It is unknown from the survey response how the Council's communication network could be improved. One thing is certain, that increased communication between the manager and the angler will be expensive. This communication network is necessary so that licence holders can be informed, and so that the new Council can attempt to show that it is not a static bureacratic body but a foward looking management agency with the best interests of the fishery and the angler in mind. This communication network could also be used to "educate" licence holders. The Council, for example,is already attempting to inform anglers of the concept of catch and release to preserve stocks of large fish and areas that are suseptible to angling pressure. Information for anglers is already contained on licences, in an annual report, and through press releases. However the Council could enlarge this programme to encourage more conservation awareness as it applies to the Nelson Fishery. The levels of staffing and budgetary restraints may limit what can be done, but angling in Nelson could benefit if anglers were more informed.

6) Ethics

Of major importance is the concept of ethics. Although Nelson has superb angling opportunities by international standards, it is still of concern how a relatively virgin resource will withstand the growing pressure of sport fishing and human encroachment on habitat. The long term answer may be in ethics rather than regulations. Ethics are moral precepts that keep people from breaking the law when no-one is looking.

Ethical behaviour in fishing is like ethical behaviour in life. It is an individual thing and the definition varies from person to person, so definitive

classifications can not be given. However ethical anglers should show respect for the sport of angling, the fishery resource, and the environment in general.

Ethical fishing would demonstrate an appreciation of the rights of other anglers, and respect for the resource in general. An ethical angler would always be considerate of other anglers, and would comply fully with all angling regulations. The ethical angler would realise that trout angling is for enjoyment, that fishing pleasure is not measured by the weight of dead fish, but by the size and scale of angling difficulty offered by the particular fish caught (and released ?) in an aesthetic environment. It is possible that many Nelson anglers have embraced such values, and this is probably true of the more successful ones, as evidenced by the high rates of catch and release shown in the study. However it is important in a time of increased pressure on resources that most anglers accept the importance of ethical behaviour. Failure to do so will lead to increased conflict between angler groups and individuals, meaning decreased angling satisfaction for all.

Anglers should not be ruled by greed, egotism or stupidity, they should strive to have common sense and courtesy. This is the message the first New Zealanders, the Maori, have been telling us for over a century. Probably much of the blame in this regard can be attributed to ignorance. This is due to a lack of education about the profound effects a single angler can have on the natural resources around him or her. This is where the Fish and Game Council may be able to influence anglers, by attempting to impart increased awareness to licence holders, so as to minimise the impact of angling and maximise the quality of angling for all users.

7) Access

7a) Marginal Strips

Another major area of concern is that of access to fishing locations. Habitat protection, angling regulations, and ethics are probably of little concern to

many anglers if they have limited places to fish.

Traditionally New Zealanders' have had ample access to waterbodies, with the country's egalitarian founders ensuring access to and along most waterways through provision of the "Queen's Chain". The "Queen's Chain" theoretically allowed about 20 metres along each side of a water body for public access. There were fears of losing this access right when Government proposed disposing of its statutory obligation in maintaining such areas. However public access has been assured through the provision of "marginal Strips" which are essentially the same as the "Queens Chain" except that the marginal strips are unsurveyed and follow the edge of the water body, even if a river changes course. Such marginal strips have been put in legislation through the Conservation Law Reform Bill, and will also be included in the Resource Management Law Reform Bill, when it goes through Parliament in mid 1991.

7b) Sale of Access Rights

Within New Zealand it is illegal to sell hunting and fishing rights, however access fees are a different matter. Within New Zealand, access fees are already reasonably common, fortunately, all examples this writer knows of occur outside the study area. However if the marginal strips were removed and passed into private ownership then this practice would become common as the new owners would see the financial opportunities in charging access fees. The question of whether people will pay is not really important, as market forces will rule, and angling demand will mean that access fees become the norm. If this is allowed to occur then New Zealand and Nelson, anglers will have suffered a great loss.

At present the Department of Conservation, trying to collect revenue from resource based rentals, is in the process of dramatically increasing concession rates for professional fishing guides to unrealistic levels.

Concessions are granted to professional guides to use areas under the control of the Department of Conservation, with a set charge being levied. Often these rental charges bear no relationship to the minor use made of such areas by fishing guides, and appear poorly thought out by this department. One wonders when the Department of Conservation will attempt to impose such charges on the recreational anglers and general public of New Zealand.

7c) Sale of Traditional Angler Access Areas to Overseas Buyers

Concern has also been raised recently by a number of organisations and individuals with the present Government's policy of selling off State owned assets to overseas buyers. Many state owned exotic forests have been sold off, particularly in the North Island. Apart from the direct threats to rivers from overseas owners, prepared to take environmental short-cuts to ensure a profit, there is the threat of access to waterbodies being terminated. Already in the North Island access is being denied to hunters and anglers in such areas. Traditionally access has been free and generally unrestricted, except for the high risk fire season. Many areas could possibly be affected within the Nelson study area, in particular the Motueka catchment and adjacent Fish and Game Districts, in the near future, unless the Goverment seeks assurances of access from foreign buyers and obtains a legal obligation from such buyers to allow access for recreationalists.

d) Advocacy For Access Rights

The Council should continue to rigorously oppose the loss of access for anglers, whatever its cause, and vehemently oppose the imposition of angling access fees, whatever their nature.

The Council should continue to encourage anglers to be diplomatic to landowners, asking permission to cross land and conducting themselves in such a way that ensures a welcome for those following after them.

e) Provision of Angler Access in Certain Areas

An angler's access system, such as that within the Buller catchment, has strong potential. At present the Upper Buller river (above Harley Rock Bridge) has angler access areas marked along the main road. These signs are placed with the permission of landowners, to enable anglers' access across farmland to the waters edge. Such signs mean that anglers need not ask permission as it has been sought on their behalf by the fisheries manager. It also means landowners are not deluged with inquiries about permission to fish with monotonous regularity. Such a service benefits the landowner, by his/her knowing that cars parked at such points are anglers; by restricting impact on the landowner's crops or activities to certain areas; and ensuring that fences are not damaged through the provision of stiles etc. Provision of anglers access benefits anglers by having assured access to the angling location and also allows the development of constructive relationships between the angler and the landowner. It also gives the angler some idea in advance that other people are fishing in a given area and the spacing of such areas means that angling activity is more distributed with less pressure on the fishery. Most importantly, such provisions for access reduce the contact and consequent conflict between anglers desiring an individual experience. The anglers' access system benefits the Fish and Game Council by acting as a public relations exercise between landowner and angler and also acts as a reminder to anglers of where his/her licence fees are spent. In brief, such angler's access facilities increase the fishery manager's profile, not only to anglers but also to the general public who use the same roads.

There is a case for the further development of such services in other high use areas within the Nelson District. Heavily fished areas such as the Lower Motueka, Wangapeka, and Riwaka could benefit from some system of this type. It is probably inevitable with increased land development, the proliferation of small landowners, and increased angler numbers, that areas

such as the lower Motueka will unfortunately become subject to conflicts between anglers and landowners. The council could seek to avoid some of these difficulties before they arise by seeking an accord with landowners. Other rivers that may benefit from the placing of angler access' could be the Mangles/Tutaki and the Owen rives in the Buller catchment, and the Motupiko within the Motueka catchments. Fortunately access is quaranteed indefinitely in lakes Rotoiti and Rotoroa and their tributaries ,the Travers, Sabine and D'Urville rivers, through their inclusion within the Nelson Lakes National Park.

Assuring the access of anglers to the fishing resource in the future is a major undertaking , but one that is necessary if the rights of anglers are to be maintained.

8) The Future

Fishery Managers in the future will need to ensure that the quality of trout fishing within the District is maintained. With more angling pressure on the resource and competition with other users for the right to the water resource, increasing stress will be applied to the angling rivers of Nelson. Future fishery managers will be faced with a greater advocacy role, on the behalf of anglers, to safeguard the interests of trout anglers within the Nelson District. In order to effectively represent the interests of anglers, fishery managers will need to be increasingly conversant with the needs, behaviours, and motivations that attend angling groups within Nelson. To understand such characteristics, more research will be required. This present study has explored many issues of direct relevance to fisheries management within the Nelson District and has provided a base for further studies of this nature.

REFERENCES

ADAMS,S.W. (1979) Segmentation of a recreational fishing market: a canonical analysis of fishing attributes and party composition. Journ. Leisure Research 11(1):82-91.

ALLEN,K.Radway; CUNNINGHAM,B.T. (1957) NZ angling 1947-52:Results of the diary scheme. NZ Marine Department,Fisheries Bulletin 12:153pp

BROWN,R.E. (1968) A survey of Participation, motivation, criteria for satisfaction and socio-economic characteristics of trout fishing anglers. Msc. Thesis, University of Michigan,USA.

BRYAN,H. (1977) Leisure value systems and recreational specialisation: the case of trout fishermen. Journ. Leisure Research 9(3): 174-187.

BUCHANAN,T; CHRISTENSEN,J.E; BURGE,R.J. (1981) Social groups and the meanings of outdoor recreation activities. Journ. Leisure Research 13(3): 254-266.

BUCHANAN,T. (1983) Toward an understanding of variability in satisfactions within activities. Journ. Leisure Research 15(1): 39-51.

CHIPMAN,B.D; Helfrich,L.A. (1988) Recreational specialisations and motivations of virginia river anglers. North Amer. Journ. Fisheries Management 8: 390-398.

CLAWSON,M. (1959) Statistical data available for economic research on certain types of recreation. Journ. Amer. Stat. Assoc. Vol.54, No.285: 281-309.

CLAWSON,M. (1965) Economic aspects of sport fishing. Canadian Fisheries Reports, No.4: 12-24 (symposium on economic aspects of fisheries within canada), Ottawa.

CLAWSON,M; KNETSCH,J.L. (1963) Outdoor recreation research: some concepts and suggested areas of study. Reprint No.43, Resources for the Future,Inc., Washington: 25pp.

CLAWSON,M; KNETSCH,J.L. (1966) Economics of outdoor recreation. Resources for the Future Inc. John Hopkins Press, Baltimore, Maryland: 328pp.

COLLINS Pocket English Dictionary (1981) Collins, London

DARBY,H.C. (1967) The Recreational and Amenity Use of Water, in the Journal of the Institution of Water Engineers,21(3): 225-231.

ENTWISTLE,A.C. (1989) Application For Water Conservation Order In Buller River Catchment, re: Nelson Acclimatisation Society 13pp

GRAYNOTH, E. (1973). New Zealand Angling 1947-68. Statistical Analysis of the National Angling Diary and Postal Questionnaire Schemes. N.Z. Min. Agiculture and Fisheries Technical Report

GRAYNOTH,E; SKRZYNSKI,W. (1974) The Nelson Trout Fishery. M.A.F. Fisheries Technical Report, No.119: 35pp, Wellington,NZ.

GREY,Zane. (1926) Tales of the Anglers Eldorado: New Zealand, New York

HUGHEY,K. (1982) Attitudes and perceptions to river development; a survey of the NZ salmon anglers Assoc. NZ Salmon Anglers Assoc: Canterbury17pp.

JELLYMAN,D. (1982) Fish stocks and fisheries of the Ahuriri river system. Fisheries Environmental Report No.26. MAFFish,Chch,NZ.

LIME, D.W; STANKEY, G.H. (1974) Carrying Capacity: Maintaining Outdoor Recreation Quality, in Van Doren,C.S; Priddle,G.B; Lewis,J.E. (editors) (1974) Land and Leisure: concepts and methods in outdoor recreation. 2nd Edition, Methuen, London: 317pp.

MARSH, N. (1983) Troutstream Insects of New Zealand. Millwood Press, Wellington

McDOWELL,R.M. (1984) Trout in New Zealand Waters. Fish and Fowl Series, No.4: 120pp. Wetland Press, NZ.

McFADDEN,J.T. (1969) Trends in freshwater sport fisheries of North America. Trans. Amer. Fisheries Society, No.98: 136-150.

McKELVEY,P.J. (1965) Recreation and amenity in indigenous state forests. NZ Journ. Forestry, Vol.10, No.2: 175-184.

DEPARTMENT OF STATISTICS(1986). NZ Census of Population and Dwellings, Regional Statistics- Nelson Bays Local Government Region. Series B, Report 16. Department of Statistics, Well., NZ.

O'RIORDAN,T. (1967) Multipurpose Water Resources Management in the Northern Rivers of Broadland, United Kingdom. phD Thesis, University of Cambridge, England.

REID,L.M; BARLOWE,R. (1962) Quality of outdoor recreation as evidenced by user satisfactions. ORRRC Report 5: 95pp. Washington, D.C.

RICHARDSON,J; UNWIN,M.J: TIERNEY,L.D. (1984) The relative value of Nelson rivers to NZ anglers. Fisheries Environmental Report No.45. MAF,Well,NZ. 75pp.

ROBERTSON,C.M. (1986) Recreational use of Marlborough rivers. Marlborough Catchment Board and Regional Water Board: 222pp. Blenheim, NZ.

SMITH,S.C. (1989) Wellington district angler survey: a survey of angling use and opinion. Wellington Acclimatisation Society Technical Report 1989/1.

SOWMAN,W.C.R. (1981) Meadow,mountain, forest and stream: the provincial history of the Nelson acclimatisation society 1863-1968. Nelson Acclimatisation Society: 183pp. Nelson,NZ.

STANKEY, G.H. (1974) Some Social Concepts For Outdoor Recreation Planning, pp 141-149, in Van Doren, et al, (1974). Land and Leisure - Concepts and Methods in Outdoor Recreation. 2nd Edition, Methuen 1974.

TARANAKI CATCHMENT COMMISSION. (1980) Recreational use of water in North Taranaki. Taranaki Catchment Commission. Stratford.

TAYLOR,A.R. (1984) How much water do recreationalists need? MAF Agricultural Engineering Conference, Lincoln College, 2-6 July. 13pp

TIERNEY,I. (1988) Facts, figures and perceptions about river angling in New Zealand. Freshwater Catch, July No.36.

TOYNBEE,P.G. (1974) Trout Fishing in Nelson, M.A.Thesis, University of Canterbury

APPENDIX I

Overseas angler questionnaire

In an attempt to assess why overseas anglers came to New Zealand, and especially Nelson to fish, a guided overseas angler questionnaire was designed and distributed via fishing guides. The questionnaire had a very poor response rate. This problem was partly through relying on others to collect this information. Eleven replies out of one hundred distributed copies gave a response rate of 11%.

Of the guided anglers who completed the questionnaire, 6 were from the USA, 3 from the UK, one Canadian and one Australian.

Of the respondants 10 were male and 1 was female. Their ages ranged between 33 and 61 with the median age being 46 and the modal age being 61.

In most cases it was the respondent's first visit to NZ except for one American on his fourth trip,and one UK angler and the Canadian on their second NZ trip. The Australian angler had visited NZ 8 times prior to the 1990 visit, this perhaps reflecting the closer proximity of this individual to NZ.

Seven respondents were accompanied by others on their visit. Three respondents specified that this was their wife, the other accompanied respondents only specified a positive answer.

Eight respondents indicated that their principal reason for visiting NZ was to trout fish, while the other three respondents expressed touring or a holiday as their major reason.

The preferred angling method was fly fishing, as specified by 10 respondents, the other remaining respondent refined his fishing method more - specifying salt-water fly fishing.

The cost of the NZ section of each respondents trip varied. These values excluded external airfares and refer to costs incurred in NZ only. The six US angler estimates ranged in cost between $2500 - $8000 (US), whilst the UK anglers and the Canadian estimated it would cost them in the range $4000 - $7000 (NZ). The Australian angler anticipated a cost of $8000 (Aus.).

Two questions asked in the questionnaire caused confusion to the respondents. This was probably due to poor wording within the questionnaire. The length of visits ranged between 4 - 28 days, however there was confusion over whether this was in Nelson or in NZ as a whole. This problem also manifested itself in question 5 when the actual number of days fished was examined. There was confusion over the days fished in Nelson or the total NZ fishing trip. Responses ranged from 3 - 15 days fished.

Most respondents had fished areas other than Nelson, either on this visit or on past fishing trips. Only 4 respondents had not fished in other areas or NZ at all before. Places that were fished outside the Nelson District were Taupo (# 6), Brunner (# 2), and Poronui Station - Central North Island (# 1)

Nine respondents indicated that they intended to fish other regions within NZ, however there was confusion over whether this was on this trip or was to occur another time.

In regard to general comments on their visit to Nelson, respondents made 23 positive responses. These were divided into five major groups: friendly people and service (#4), river and fishing quality (#5), large size of fish (#6), guides and lodges (#4), and scenic beauty (#4). Typical comments were "rivers, people, fish ", "expertise of guides ","challenge aspect of fishing ", and friendliness of local people". One respondent summarised the feelings of most respondents when commenting on the size of the trout available,"challenge of big fish: the work involved in successfully approaching, casting to and landing a trophy (by American standards) trout ".

Respondents were less candid about discussing factors they disliked about Nelson as this section was often left unanswered. Only 6 negative replies were registered. Four of these referred to the minor problem of sandflies while one respondent criticised the terrible service he had received whilst travelling on the Inter-Island ferry. One other respondent commented on the amount of walking between trout and the lengths of daily walks, but stated that he realised this was necessary.

Anglers were finally asked what prompted them to decide to fish in Nelson. Out of 16 responses, 10 indicated that respondents had heard about the reputation of Nelson rivers overseas. One response stated that Frontiers, an international fishing promotional company was responsible for the respondent fishing in Nelson, while another indicated that the respondents fishing was due to a holiday by chance. Three respondents came to fish with a particular guide within Nelson, while no visiting anglers were advised by local anglers after they had arrived in Nelson.

In conclusion then, it would appear, on the basis of very limited information, that most visiting anglers whatever their country of origin are male, past middle age, accompanied by others and come especially to NZ to fly fish for trout. They spend relatively large sums of money, travel throughout the country - many being on return visits, and usually stay for time periods exceeding a week in length. Many intend to return to Nelson and NZ to fish. The respondents appreciated friendly people and service, river and fishing quality, large size of fish, their guides and accomodation and scenic beauty. They disliked few factors within Nelson. Most had heard of Nelson rivers overseas and some anglers came especially to fish with a particular guide

APPENDIX II

Angling Regulations Within the Nelson Study Area during the 1989/90 Fishing Season.

The open fishing season within the former Nelson Acclimatisation District was from the 1st of October to the 30th of April the following year, except that in October fishing was prohibited in Lake Daniels and in some waters winter fishing was allowed.

The maximum number of trout allowed in possession per licence holder, per day, was four fish. This policy covered all of Nelson's rivers and lakes. All fish were to be landed under sportsmanlike conditions, that is rod and line only was allowed. There was no minimum size requirement for fish killed.

The former Nelson Acclimatisation District had several special regulations which licence holders had to observe. The major tackle and method regulations affect a number of different waters. The following waters and their tributaries were designated fly-only waters whereby no lure or bait other than artificial fly was to be used:

- Maitai

- Wakapuaka

- Riwaka

- Motupiko

- Pearse

- Mangles/Tutaki

- Cobb

These rivers were largely made fly only rivers to exclude spin and bait anglers. Such regulations attempted to preserve certain waters for fly anglers who considered themselves superior to anglers who practised other methods, and also to avoid conflict between such groups. Such designations of rivers as fly only, had no biological basis.

On the Maitai river, however, junior anglers (under 16 years of age) were allowed to fish with methods other than artificial fly.

Regulations for trollers on lakes disallowed trolling within a 100 meter radius of the meeting points of major inflowing and outflowing creeks and rivers within any given lake.

Winter fishing, that is fishing outside of the regular season, was allowed in certain rivers and lakes or in specified parts of them. These areas were:

- Cobb reservoir

- Lakes Rotoiti and Rotoroa

- Waimea river

- Motueka river

- Aorere river

Such chosen rivers were spread throughout the Nelson District to give licence holders angling opportunites during the winter months. They were angling waters that are either little used during the main angling season, or were felt to be capable of sustaining higher levels of angling effort.

Closed season areas were specified for certain areas considered vulnerable to angling pressure at certain times of year or were stipulated to rest certain

waters, for either biological or sociological reasons. For example important trout spawning areas were protected over the winter spawning migrations. Breaches of these regulations render the offender liable to a penalty as stipulated in the Fisheries Act 1983 and subsequent amendments.

Fisheries regulations within the Nelson Acclimatisation District attempted to be straight foward and understandable to most licence holders. This was part of a deliberate attempt by the Nelson Acclimatisation Society Council to avoid excessive regulation and subsequent angler confusion (Mace Ward, field officer, pers. comm.).

APPENDIX III

Specific Nelson Fishing Guide Activity Data, 1989/90 Season

Table 9: Guiding Effort Within The Buller Catchment, 1989/90

River/Lake	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
Mangles	13.0	12.5	3.5	16.0	16.5	22.0	3.5	87.0
Buller(b.Kaw	4.5	11.5	4.0	7.5	24.5	13.0	4.5	69.5
Buller(a.Kaw)	10.0	9.5	4.5	16.0	8.5	12.5	6.5	67.5
Owen	8.0	4.0	5.5	8.5	12.5	13.0	2.5	54.0
Maruia	1.5	3.0	7.0	7.0	10.0	10.0	-	38.5
Tutaki	4.0	6.0	5.5	9.0	3.5	8.5	1.5	38.0
Matakitaki	3.5	3.0	1.0	3.0	5.5	4.5	-	20.5
Gowan	2.0	1.0	-	0.5	2.0	5.0	0.5	12.0
Travers	1.0	-	4.0	2.0	-	1.0	3.0	11.0
Others	-	-	-	-	4.0	0.5	-	4.5
Matiri	1.0	1.0	1.0	-	0.5	-	-	3.5
Sabine	2.0	-	0.5	-	-	-	-	2.5
D'Urville	-	1.0	-	-	-	-	-	1.0
Lake Rotoroa	-	-	0.5	-	-	-	.	0.5
Glenroy	-	-	-	-	-	0.5	-	0.5
Totals	50.5	52.5	37.0	69.5	87.5	90.5	23.0	410.5

Table 10: Guiding Effort Within The West Coast Region, 1989/90

River	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
Inangahua Trib.	1.5	5.0	4.0	7.0	8.0	7.0	-	32.5
Grey Tributary	1.0	3.0	1.0	9.0	5.0	3.5	2.2	25.0
Inangahua	1.5	1.5	1.0	3.5	5.0	7.0	1.0	20.5
Other	-	1.0	-	-	-	3.0	-	4.0
Grey	-	-	1.0	0.5	-	0.5	0.5	2.5
Totals	4.0	10.5	7.0	20.0	18.0	21.0	4.0	84.5

Table 11: Guiding Effort Within The Marlborough Region, 1989/90

River	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
Wairau(a.Wash)	2.0	1.0	8.0	-	7.0	4.5	1.0	23.5
Wairau(b.Wash)	-	3.0	1.0	1.5	5.5	3.0	-	14.0
Wairau Trib	-	1.5	-	-	0.5	-	1.0	3.0
Totals	2.0	5.5	9.0	1.5	13.0	7.5	2.0	40.5

Table 12: Guiding Effort Within The North West Nelson Region, 1989/90

River	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
Mokihinui(a)	1.0	2.0	3.0	2.0	3.0	2.0	-	13.0
Karamea Trib	-	3.0	3.0	3.0	2.0	1.0	-	12.0
Karamea(a.Bend	-	-	1.0	2.0	2.0	3.0	-	8.0
Mokihinui Trib	-	-	1.0	1.0	-	1.0	-	3.0
Mokihinui(b)	-	-	-	1.0	-	-	-	1.0
Other	-	-	-	1.0	-	-	-	1.0
Totals	1.0	5.0	8.0	10.0	7.0	7.0	-	38.0

Table 13: Guiding Effort Within The Motueka Catchment, 1989/90

River	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
Motupiko	3.0	7.5	3.0	2.5	-	3.0	1.0	20.0
Wangapeka	-	-	-	2.0	3.0	4.0	0.5	9.5
Rainy	-	2.0	1.0	-	0.5	-	0.5	4.0
Other	-	-	-	-	-	2.0	-	2.0
Pearse	-	-	-	-	0.5	1.0	-	1.5
Motueka(a.Wang)	-	-	-	-	-	1.0	-	1.0
Motueka(b.Wang)	-	-	-	-	0.5	-	-	0.5
Totals	3.0	9.5	4.0	4.5	5.0	11.0	2.0	38.0

APPENDIX IV

Fishing Methods and Techniques Within the Study Area.

Angling groups can be separated by the angling technique they practice, as seen earlier in this chapter, through the concept of recreational specialisation (Bryan 1977, Chipman et al,1983).

The rivers of Nelson because of their very nature provide challenging fishing. Angling for large brown trout, in often "gin-clear" water ensures this. As a result various methods of angling provide better results than others. Also, as in other sports there is no substitute for knowlege and experience, and experienced anglers tend to have the best catches.

Generally fly anglers tend to have the best catch rates whilst the other methods such as spinning, trolling, and bait fishing are less successful. This however can depend on environmental conditions. Through the process of recreational specialisation though, fly anglers tend to be the most experienced and keenest, this combination coupled with a very successful method to catch clear water trout, tends to ensure higher catch rates.

Fly fishing refers to the method which attemps to imitate trout foods through artificial imitations representing insects and small fish etc.

Upstream fly fishing is the most successful in Nelson due to the clarity of the water and the wariness of the quarry- brown trout.

Upstream nymph fishing which uses imitation sunken flies, often weighted with lead, to imitate immature stages of aquatic insects is usually the most successful.

The clarity of the water and large size of trout makes the technique of

"spotting" possible on most rivers, assuming adequate river and weather conditions. This technique involves an angling participant wading upstream or walking along the shore of a river looking in likely holding or feeding locations for trout to cast at, rather than blindly casting into the river hoping to locate a trout.

Brown trout commonly concentrate on the edges of rivers, along current lines etc to feed, and therefore become vulnerable to being spotted by anglers stalking the edge of the river. This technique can take the "chuck and chance" element out of angling and often results in higher catch rates. This technique is especially important in backcountry and wilderness rivers where low numbers of large trout mean that a highly mobile "spotting" angler can greatly increase his/her opportunities. This technique means that often large distances of water are covered in the course of a days fishing (commonly 3-5km). This means that fewer anglers can be accomodated on a certain stretch of river at a given level of "required solitude".

Fly anglers can also fish "blind", whereby they cast to areas they expect a trout may be occupying. This is a more intensive method than the semi-extensive "spotting" method. However a combination of blind and spotting techniques can and do occur. Blind fishing can be practised either upstream or downstream. During the day the upstream technique normally being more successful when a trout's vision is at its peak and it is more sensitive to disturbance. However the downstream "blind" method is also a popular method in the evening when trout are disturbing the waters surface. After dark many downstream anglers fish an imitation of a small baitfish to catch above average size trout.

Spinning incorporates the use of a metal lure possibly imitating small fish. This method is less skilful than fly fishing but is easier to learn and in the hands of a skilful angler can be effective, especially early in the angling season or in times of highwater flow. Spinning can be practised either

upstream or downstream. Its efficiency as a fish catching method decreases during times of low water flow. Participants generally will tend to fish less water than active upstream fly anglers, as they are mostly casting blind and the frequency of casts tends to slow their progression up or downstream.

Trolling refers to the method of fishing metal lures behind a moving boat. This method is usually only practised on the two largest lakes within the Nelson region, Lakes Rotoiti and Rotoroa. Some trollers use a specialised line called a leadline to troll their lure deeper in the water column. Regulations prohibit trolling within 100 metres of rivermouths and deltas.

Trolling generally has low ratios of success in regard to fish landed, although certain conditions and skilful technique can produce good catches.

Bait fishing is usually practised most often by junior anglers. Nelson's clear rivers probably don't suit bait fishing to any great extent.

APPENDIX V

QUESTIONNAIRE AND LETTERS OF INTR ODUCTION

- LOCAL ANGLERS

Department of Geography
University of Canterbury Christchurch 1 New Zealand
Telephone: (03) 667-001
Fax: (03) 642-999

NELSON ACCLIMATISATION SOCIETY
Office: 1st FLOOR, CLIFFORD HOUSE
38 HALIFAX STREET, P.O. BOX 190,
NELSON.
TELEPHONE (054) 84894. H.Q. (054) 46382.

June 1990

Dear Angler,

The fishing questionnaire accompanying this letter is part of a survey examining various aspects of trout fishing in Nelson.

As part of a Masters degree at the University of Canterbury, I am undertaking research on patterns of recreational trout fishing use within and beyond the Nelson Acclimatisation District by anglers living in the Nelson region.The study in particular,examines the resource management implications of these patterns of angling use.

This study has the co-operation and assistance of the Nelson Acclimatisation Society which hopes to use the information for fisheries management within the Nelson Acclimatisation District and therefore benefit you as an angler.

The questionnaire will only take about 10-15 minutes of your time to complete and place in the enclosed stamped addressed envelope ready for posting back to me.

The questionnaire sent to you as one of 400 randomly selected adult anglers who purchased whole 1989/90 season licences, is of major importance to the whole survey and your co-operation is essential if the results are to be meaningful.

The results of this survey will be written up as a Masters thesis in Geography, a copy of which will be available to you in the Nelson Public Library.

It is hoped that the thesis will be of interest to both yourself and fellow anglers, as well as to the Nelson Acclimatisation Society and other bodies concerned with trout fishing in Nelson.

Thank you in anticipation of your co-operation.

Yours Sincerely

Zane S. Mirfin
Masters Student
Geography Department
University of Canterbury
Private Bag
Christchurch 1.

Department of Geography
University of Canterbury Christchurch 1 New Zealand
Telephone: (03) 667-001
Fax: (03) 642-999

NELSON ACCLIMATISATION SOCIETY
Office: 1st FLOOR, CLIFFORD HOUSE
38 HALIFAX STREET, P.O. BOX 190,
NELSON.
TELEPHONE (054) 84894. H.Q. (054) 46382.

June 1990

NELSON REGIONAL ANGLER SURVEY:1989/90 SEASON.

Dear Angler,

Last week a questionnaire was posted to you about your use,as an angler,of the Nelson Acclimatisation District.

If you have already completed and returned it to me, please accept my sincere thanks. If not, **please do so today.**

Because it has been sent to only a small but representative, sample of anglers in the Nelson region,it is extremely important that your response be included in the study.

If by some chance you did not receive the questionnaire, or it has been misplaced, please call the Nelson Acclimatisation Society Field Officer (Mace Ward) at (054) 46382 (collect) and Mace will get another one in the mail to you.

Yours Sincerely

Zane S. Mirfin
Masters Student
Geography Department
University of Canterbury
Private Bag Christchurch 1.

Department of Geography
University of Canterbury Christchurch 1 New Zealand
Telephone: (03) 667-001
Fax: (03) 642-999

NELSON ACCLIMATISATION SOCIETY

Office: 1st FLOOR, CLIFFORD HOUSE
38 HALIFAX STREET, P.O. BOX 190,
NELSON.
TELEPHONE (054) 84894. H.Q. (054) 46382.

June 1990

Dear Angler,

Reminder Notice

This letter is to remind you about returning the trout fishing questionnaire that was sent to you earlier this month.The questionnaire was accompanied with a stamped addressed envelope so that it could be returned.

I would be grateful if you could complete the questionnaire as soon as possible and return it to me.

Even if you did not make many trips or catch many fish, your results are still important to my study. Only by having a random sample, can I make sure that my study findings are fully representative of Nelson anglers.

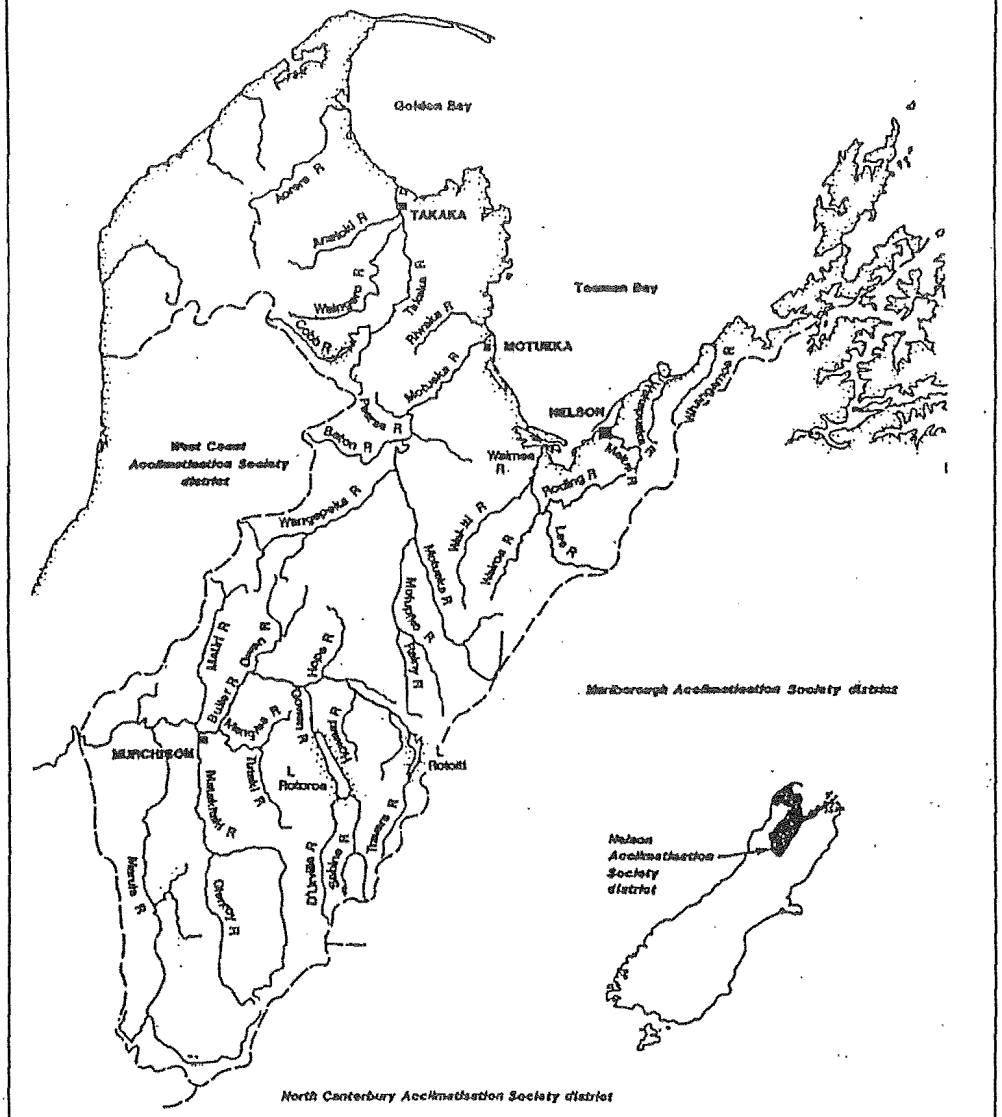
All information collected in this questionnaire is confidential and anonymity of the individual anglers is guaranteed.

Thank you for your co-operation in the return of the completed questionnaire.

Yours Sincerely

Zane S. Mirfin
Masters Student
Geography Department
University of Canterbury
Private Bag
Christchurch 1 .

NELSON REGIONAL ANGLER QUESTIONNAIRE 1989-1990 Season



3

INSTRUCTIONS

It is very important that **every** questionnaire is returned with as much of it filled in as possible.

The number written on the front of the booklet is so your name can be crossed from the list once your questionnaire is returned. At no time will your name appear on the questionnaire,and therefore your answers will remain confidential.

The major area under study is shown on the cover of the questionnaire.You may find the map useful in answering some questions.

When answering this questionnaire please tick the appropriate box for each question.In other cases you will be asked to either write a number in a box or explain your answer in a few words.

---

1) How many years have you been trout fishing ?

1 ☐ 2-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21+ ☐

2) On how many days did you do some fishing this season ?

0 ☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐

Over 25 (please specify number of days)_____

If you did no fishing this season, please go straight to question 16.

3) What is your predominant angling method ?

Upstream fly ☐ Downstream fly ☐ Spinning ☐ Trolling ☐ Bait ☐

Other (please specify)_____

4

4) Which month or months did you do the most fishing during the season ?

October ☐ November ☐ December ☐ January ☐

February ☐ March ☐ April ☐

5) Which day or days of the week did you do most of your fishing on ?

Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐

Saturday ☐ Sunday ☐ All days of same importance ☐

6) What hours of the day would you fish on a normal fishing day (excluding travel times) ?

Please write times in boxes provided and indicate whether am or pm.

Start ☐ am/pm Finish ☐ am/pm

7) What is the maximum time period you are prepared to travel for a normal days fishing ?

Under .5 hr ☐ .5-1.0 hr ☐ 1.0-1.5 hrs ☐ 1.5-2.0 hrs ☐ 2.0 hrs+ ☐

8) How many trout did you catch this season ?

Make your best estimate.

Brown trout _____

Rainbow trout _____

Total _____

5

9) Of the trout above 30 cm (12 inches) that you landed, what proportion (if any) did you release ?

0 ☐ Under 25% ☐ 26-50% ☐ 51-75% ☐ Over 75% ☐

10)How often did you participate in the following forms of fishing outing this past season ?

Please tick one item in each row of boxes.Use the key provided to decide which level of use applies to you.

High = 6+ trips per season.

Medium = 3-5 trips per season.

Low = 1-2 trips per season.

Nil = 0 trips per season.

a) Daytrips from residential home

High ☐ Medium ☐ Low ☐ Nil ☐

b) Overnight/Weekend trips

High ☐ Medium ☐ Low ☐ Nil ☐

c) Multiple day e.g. camping/backcountry trips

High ☐ Medium ☐ Low ☐ Nil ☐

6

Locational Aspects of Angling

The following questions are asked to gain some appreciation of where angling effort is directed by Nelson District anglers both within and beyond the Nelson Acclimatisation District.

11) Please indicate the number of days on which you did some fishing on the following waters within the Nelson Acclimatisation District.For example Matiri [2]

For rivers that were not fished please put a dash (-) or zero (0) in the appropriate boxes.Alternatively you may wish to use a single vertical line to cross out a major section of waters you did not fish during the season.

The water bodies are divided into major catchment or regional divisions for your easy reference.

Buller Catchment

Travers		D'Urville	
Lake Rotoiti		Sabine	
Buller(above Kawatiri)		Owen	
Buller(below Kawatiri)		Mangles	
Howard		Tutaki	
Hope		Matiri	
Gowan		Matakitaki	
Lake Rotorua		Glenroy	
Maruia		Other	
Lake Daniels			

Motueka Catchment

Motueka(above Wangapeka)		Baton	
Motueka(below Wangapeka)		Pearse	
Motupiko		Graham	
Rainy		Tadmor	
Wangapeka			
Other		Riwaka	

7

Eastern Rivers

Waimea	☐	Maitai	☐
Wairoa	☐		
Lee	☐	Wakapuaka	☐
Roding	☐		
Wai-iti	☐	Whangamoa	☐

Golden Bay Rivers

Takaka	☐	Aorere	☐
Cobb	☐		
Cobb Reservoir	☐	Other	☐
Waingaro	☐		
Anatoki	☐		

12) What proportion of your fishing was done **outside** of the Nelson Acclimatisation District ?

Please see the cover of this booklet if you are unsure of boundaries.

0 ☐ Under 25% ☐ 26-50% ☐ 51-75% ☐ Over 75% ☐

13) If you fished **outside** of the Nelson Acclimatisation District,what other rivers did you fish?Please use the boxes to show the numbers of days fished on each river named.

e.g. Rai	3		

It would help this study to know what makes certain areas important to anglers living in the Nelson District.These areas can include river systems outside of the Nelson Acclimatisation District.

14) Please write the name of the river or river catchment that provided your **most** enjoyable angling experience(s) this past season.

_____

Why was this ?

_____

_____

8

15) Please write the name of the river or river catchment that provided your least enjoyable angling experience(s) this past season.

_____

Why was this ?

_____

_____

_____

Personal Angler Characteristics

It would also help this study to know something about the characteristics of the people who go fishing.

16) What is your age ?

16-25 ☐ 26-35 ☐ 36-45 ☐ 46-55 ☐ 56-65 ☐ 66+ ☐

17) What is your sex ?

Male ☐ Female ☐

18) In your opinion, what is your fishing skill level ?

Excellent ☐ Good ☐ Fair ☐ Poor ☐

19) What is your ability to move about when fishing on streamside ?

I can walk anywhere ☐ I have trouble walking some places ☐

The number of places I can walk are limited ☐

9

Fishing Opinion Section

20) To what extent, based on your fishing experience, has the quality and quantity of angling within the Nelson Acclimatisation District changed over time ?

No change ☐ Minor change ☐ Major change ☐ Unable to comment ☐

If there has been a change,what have these changes been ?

Positive Changes	Negative Changes
_____	_____
_____	_____
_____	_____
_____	_____

What do you think has caused these changes ?

Positive Changes	Negative Changes
_____	_____
_____	_____
_____	_____
_____	_____

21) Finally, are there any comments, suggestions or criticisms you would like to make on any aspect of trout fishing or its management within the Nelson Acclimatisation District ?

_____

_____

_____

_____

_____

11

Thank you for your co-operation in completing this questionnaire.

Now that you have finished, place the questionaire in the return envelope and post it back.

No stamp is required.

Remember: If you have any questions or concerns, don't hesitate to contact:

Zane Mirfin
Geography Department
University of Canterbury
Private Bag
Christchurch 1.

Ph.(03) 667 001
ext. 8079

or

Mace Ward
Field Officer
Nelson Acclimatisation Society
P.O. Box 190
Nelson.

Ph.(054) 46382

APPENDIX VI

QUESTIONNAIRE , LETTER OF INTRODUCTION, AND INSTRUCTION SHEET - PROFESSIONAL FISHING GUIDES

TELEPHONE 84-894

P.O. BOX 190, NELSON .

NELSON ACCLIMATISATION SOCIETY

Secretary: A. L. SAVAGE, A.C.A.
Office: 1st FLOOR, CLIFFORD HOUSE, 38 HALIFAX STREET, NELSON.

Dear

GUIDED ANGLER STATISTICS

As part of a Masters Degree at the University of Canterbury I am undertaking research on patterns of recreational trout fishing use within the Nelson Acclimatisation District, with particular emphasis on the resource management implications of these patterns of angling use. Angling use of other districts by Nelson anglers is also being examined.

The majority of my research will centre around a questionnaire sent to local resident anglers at the end of the 1989/90 fishing season. This questionnaire will be carried out in conjunction with the Nelson Acclimatisation Society.

However, I also hope to examine guided fishing in relation to amateur recreational use of Nelson's rivers. All information collected will contribute to future management of the Nelson trout fishery for all fishery users. It must be stressed that guides will not be discriminated against at the conclusion of the study and are recognised as legitimate users of the fishery.

Guide co-operation in completing the following guide questionnaire on a monthly basis would be greatly appreciated.

Any information asked for on the questionnaire will be treated confidentially and will not be subject to public disclosure. All guides will receive code numbers (known only to me) to safeguard their identity and data collected will be analysed collectively. That is, individual guides or groups of guides will not be identified within the analysis.

My study will culminate in the publication of a thesis in November 1990. Guides who assist with information will receive a pre-publication summary of results for their own use.

Fisheries & Game Management

....2

Please find enclosed a number of questionnaire forms and a separate instruction sheet explaining individual questions and what the particular data collected will be used for.

Should you have any enquiries, criticisms etc, please contact me and we can discuss the issue(s). I will remain in contact to collect completed questionnaires and/or provide additional ones on an ongoing basis.

Thank you in anticipation
of your co-operation.

Yours faithfully

ZANE MARFIN
Masters Thesis Student
Geography Department
University of Canterbury

22.01.1990

Contact Address up until March 1990:

C/- 45 Norwich Street
Stoke.
Nelson

Phone 75554

Fisheries & Game Management

TROUT FISHING GUIDE QUESTIONNAIRE 1989-90

Month:
Guide Code Number:

i. GUIDED ANGLER STATISTICS

a. Country of Angler Origin

COUNTRY	NUMBER OF ANGLERS
U.S.A.	
U.K.	
AUSTRALIA	
JAPAN	
OTHER (NAME BELOW)	

b. Number of Anglers Guided per day

NUMBER OF ANGLERS	NO. DAYS PER MONTH
1	
2	
3	
4	

c. Skill Level of Guided Anglers

SKILL LEVEL	NUMBER OF ANGLERS
a (Excellent)	
b (Good)	
c (O.K.)	
d (Poor)	

d. Client Mobility on River

MOBILITY LEVEL	NUMBER OF ANGLERS
a (Excellent)	
b (Good)	
c (OK)	
d (Poor)	

e. Sex of Guided Anglers

SEX	NUMBER OF ANGLERS
Male	
Female	

f. Angling Method

METHOD	NUMBER OF DAYS
Upstream Fly	
Downstream Fly	
Spinning	
Trolling	

ii. TROUT STATISTICS FOR MONTH

No/Species of Trout	Number of Fish
No. Brown Trout Landed	
No Rainbow Trout Landed	
Total Number of Trout Landed	

b. Total Number of Trout Released _____

c. Trophy Fish (Over 6lb) Landed

No Trophy Fish Landed	Location
Local / Helicopter	
	Nelson
	Marlborough
	West Coast
	Other

iii. GUIDING STATISTICS FOR MONTH

a. How many days did you guide forthe month _____

b. How many of these days were helicopter trips? _____

c. How many guided days used car/boat transport? _____

IV. GUIDING LOCATION COMPONENTS FOR MONTH

Use accompanying river code sheet when completing this section

BULLER CATCHMENT		MOTUEKA CATCHMENT		EASTERN RIVERS		GOLDEN BAY RIVERS		NW NELSON RIVERS		MARLBOROUGH RIVERS		WEST COAST RIVERS		OTHER DISTRICT	
CODE	Guided Fishing Days Inclusive 1/2 days	CODE	Guided Fishing Days Inclusive 1/2 days	CODE	Guided Fishing Days Inclusive 1/2 days	CODE	Guided Fishing Days Inclusive 1/2 days	CODE	Guided Fishing Days Inclusive 1/2 days	CODE	Guided Fishing Days Inclusive 1/2 days	CODE	Guided Fishing Days Inclusive 1/2 days	CODE	Guided Fishing Days Inclusive 1/2 days
A		B		D		H		J		M		R			
A1		B1		D1		H1		J1		M1		R1			
A2		B2		D2		H2		J2		M2		S			
A3		B3		D3		H3		K		N		S1			
A4		B4		D4		H4		K1		N1		T			
A5		B5		E		H5		K2		N2					
A6		B6		F		I		K3		O					
A7		B7				I1		L		P					
A8		B8								Q					
A9		B9													
A10		C													
A11															
A12															
A13															
A14															
A15															
A16															
A17															
A18															

RIVER CODE SHEET

BULLER CATCHMENT CODE	RIVER/LAKE	MOTUEKA CATCHMENT CODE	RIVER/LAKE	EASTERN RIVERS CODE	RIVER/LAKE	GOLDEN BAY RIVERS CODE	RIVER/LAKE	NN NELSON RIVERS CODE	RIVER/LAKE	MARLBOROUGH RIVERS CODE	RIVER/LAKE	WEST COAST RIVERS CODE	RIVER/LAKE	OTHER DISTRICT CODE	RIVER/LAKE
A	Travers	B	Motueka (Above Wang)	D	Wainea	H	Takaka	J	Karamea (Above Bend)	M	Pelorus	R	Inangahua	Specify eg. North Cant	
A1	Lake Rotoiti	B1	Motueka (Below Wang)	D1	Wairoa	H1	Cobb	J1	Karamea (Below Bend)	M1	Rai	R1	Inangahua Trib		
A2	Buller (Above Kawatiri)	B2	Motupiko	D2	Lee	H2	Cobb Reservoir	J2	Tributory (Above K Bend)	M2	Other Pel Trib	S	Grey		
A3	Buller (Below K)	B3	Rainy	D3	Roding	H3	Waingaro	J3	Tributory (Below K Bend)	N	Wairau (Above Wash Br)	S1	Grey Trib		
A4	Howard	B4	Tadmor	D4	Wai-iti	H4	Anatoki	K	Mokihinui (Above Ford)	N1	Wairau (Below Wash Br)	T	Other		
A5	Hope	B5	Wangapeka	E	Waitai	H5	Waikoropupu	K1	Mokihinui (Below Ford)	N2	Wairau Trib				
A6	Gowan	B6	Baton	F	Wakapuaka	I	Aorere	K2	Trib of Moki	O	Clarence				
A7	Lake Rotoroa	B7	Pearse	G	Whangamoa	I1	Other	L	Other	P	Awatere				
A8	D'Urville	B8	Graham							Q	Other				
A9	Sabine	B9	Other												
A10	Owen	C	Riwaka												
A11	Mangles														
A12	Tutaki														
A13	Matiri														
A14	Matakitaki														
A15	Glenroy														
A16	Maruia														
A17	Lake Daniels														
A18	Others														

INSTRUCTION SHEET

One questionaire should be filled out for each month on which some guiding was done. For example if you guided on five months you should fill out five questionaires.

Before starting filling out a questionaire it is wise to know how many days were guided for the month and how many people guided etc. Alternatively fill out question iii/ first.

An angling diary is probably most useful for filling out the questionaires. If your guiding records have not been kept it may help to write therough details for the month on scrap paper to refresh your memory. If any of the figures you record in a questionaire are estimates, please write "estimate" on the top of the questionaire sheet. Please be conservative with estimates as inflated figures are of no statistical use in assessingthe Nelson trout fishery.

FILLING OUT A QUESTIONAIRE

At the top of each questionaire the month and your guide code number should be indicated.

Your guide code number is .....

SECTION i/ GUIDED ANGLER STATISTICS

This section aims to gain an insight into guided angler characteristics. For example origin, party size, skill and mobility levels, gender and angling methods.

SECTION ii/ GUIDING STATISTICS FOR MONTH

This section will be used to examine the total days guided in and outside the Nelson region and the methods of transport used. All questionaires are confidential (hence code numbers) and all analysis will be on a collective basis. That is all questionaires from all guides will be added together. Individuals and locations will not be identified. The final thesis is not for public disclosure.

SECTION iii/ GUIDING LOCATION COMPONENTS FOR MONTH

To establish general areas of angling effort. Locations will be combined with local angler statistics to assess whether or not any angling areas are under stress. This information will be used for future Management purposes. For example, possible catch and release areas etc.
Guide comments are most welcome. If you have any comments, ideas on any aspect of the Nelson trout fishery, please feel free to record them on any blank space on a questionaire. Alternatively use a separate sheet of paper.

Angling locations are coded for anonymity. Any rivers not awarded a code should be included under thecode for "other" within their respective catchments. Tributary streams not coded should be included within the code for the main river they flow into. For example, Speargrass Creek in the Buller catchment would go under the code A2 (Buller River above Kawatiri).

Half days should be included in the number of days guided. It may be common to guide on two particular rivers within the span of one days guiding. Days such as this should be broken down when you are filling out a questionaire. For example three half days fishing the Wangapeka (B5) should be recorded as 1½ days rather than 3.

Any time spent on a particular river under roughly half a day (for example one hour) don't worry about.

ERRORS IN THE QUESTIONAIRE FORMAT

i/ Guided Angler statistics
c/ Trophy fish.

Please include fish of 6lb and over rather than only fish over 6lb.
Please do not exaggerate fish weights as this does not give a true picture of what size trout are in the rivers.

iv/ Guiding location components

Codes K and K1 are both in the Mokihinui River. The wording should read above or below the forks not ford.

Included with the blank questionaires is a sample completed questionaire to give some idea of what is required.

Finally thank you for your assistance and investment in the future of the Nelson trout fishery.

APPENDIX VII

QUESTIONNAIRE AND LETTER OF INTRODUCTION

- GUIDED OVERSEAS ANGLERS

TELEPHONE 84-894

P.O. BOX 190, NELSON.

NELSON
ACCLIMATISATION
SOCIETY

Secretary: A. L. SAVAGE, A.C.A.
Office: 1st FLOOR,
CLIFFORD HOUSE,
38 HALIFAX STREET,
NELSON.

Dear Overseas Angler

GUIDED ANGLER USAGE OF NELSON RIVERS 1989/90

Competition between Recreational and Commercial water users is becoming increasingly intense as New Zealand's rivers are developed or used for purposes which provide an economic gain - such as hydro generation and irrigation. The public's - and the angler's - concern over the continuing loss of rivers has now been recognised by legislation designed to protect the wilderness, scenic and/or recreational values of our natural rivers. However to protect such rivers we have to demonstrate how important a river is from a variety of recreational and biological viewpoints.

The Nelson Acclimatisation Society is responsible for freshwater fisheries management within the Nelson District and spends much of its time protecting the interest of anglers. To be able to do this the Society requires as much information about angler use as possible..

I am a Masters Thesis student from the University of Canterbury, undertaking research on the usage of Nelson rivers by both local and guided overseas anglers. Trout fishing guides within the district are already co-operating with guided angling statistics however certain other relevant information would be of use. This is where you may help us.

The main aims of this questionnaire are to determine the average length of stay of guided anglers who fish Nelson rivers, the amount of money they spend and why they came to Nelson to fish.

Because this questionnaire requires information about your expenses (and your age!), you may wish to remain anonymous.

...2

To avoid duplication please only fill out one of these forms during your stay.

Your co-operation is greatly appreciated.

Yours faithfully

ZANE MIRFIN
Masters Thesis Student
Geography Department
University of Canterbury

22.01.1990

Fisheries & Game Management

NELSON REGION

GUIDED OVERSEAS ANGLER QUESTIONNAIRE 1990

1. (A) COUNTRY: _____

   (B) STATE OR PROVINCE: _____

2. MALE:_____FEMALE_____

3. AGE:_____

4. LENGTH OF VISIT: _____

5. ACTUAL NUMBER OF DAYS FISHED: _____

6. NUMBER OF PREVIOUS NEW ZEALAND VISITS: _____

7. APPROXIMATE COST OF N.Z. SECTION OF TRIP: $_____

   NOTE: (A) EXCLUDE EXTERNAL AIRFARES
   (B) STATE CURRENCY EG. US$2,000

8. WHAT IS YOUR PRINCIPLE REASON FOR VISITING NEW ZEALAND : _____

9. (A) ARE YOU ACCOMPANIED BY OTHERS: _____

   (B) IF SO, ARE THEY FISHING ALSO: _____

10. WHAT IS YOUR PREFERRED ANGLING METHOD: _____

11. (A) HAVE YOU EVER FISHED STREAMS/RIVERS/LAKES IN OTHER REGIONS OF NEW ZEALAND? _____

    IF 'YES' LIST THE REGIONS (PLEASE INDICATE WETHER IT WAS ON THIS VISIT OR ON ANOTHER OCCASION):

    _____

    _____

    _____

    (B) DO YOU STILL INTEND TO FISH, IN OTHER REGIONS OF NEW ZEALAND ?

    _____

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12. GENERAL COMMENTS ON YOUR VISIT TO NELSON, WITH REGARD TO FISHING:

(A) WHAT DID YOU LIKE: _____

_____

_____

_____

(B) WHAT DID YOU DISLIKE: _____

_____

_____

13. HOW DID YOU DECIDE TO FISH IN NELSON:

(A) HEARD ABOUT THE REPUTATION OF NELSON RIVERS OVERSEAS: _____

(B) CAME TO FISH WITH A PARTICULAR GUIDE: _____

_____

(C) ADVISED BY LOCAL ANGLERS AFTER YOU HAD ARRIVED IN NELSON: _____

(E) OTHER SPECIFY: _____

_____

_____

SIGNATURE (OPTIONAL) : _____

DATE: _____

THANK YOU FOR YOUR CO-OPERATION AND WE TRUST YOU ENJOYED YOUR VISIT TO NEW ZEALAND.